

MODULE -1 (DM)

Hazards: A hazard can be defined as a potentially damaging physical event, social and economic disruption or environmental degradation. Typical examples of hazards can be absence of rain (leading to drought) or the abundance thereof (leading to floods).

Chemical manufacturing plants near settlements and incorrect agricultural techniques, can also be seen as hazards which could lead to possible disasters. Hazards can be the creation of man or the environment.

Exposure: Exposure refers to people, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

Vulnerability: Vulnerability refers to the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures.

Risk: There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures.

Risk Assessment: A risk assessment is a process to identify potential hazards and analyze what could happen if a hazard occurs.

Disaster risk assessments include: the identification of hazards; a review of the

technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability, including the physical, social, health, environmental and economic dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities with respect to likely risk scenarios

Risk Mapping: Risk mapping is a process of analyzing the hazard, vulnerability and capacity through a scientific methodology. The process of risk map preparation includes analysis of several variables and parameters which are sub-sets of base categories; hazard, vulnerability and capacity. Hence, preparation of multi hazard risk map is a combination of all risk elements on several hazards. This process is important in risk map preparation and obviously in disaster management field for appropriate implementation of disaster risk reduction activities

Capacity: Capacity refers to all the strengths, attributes and resources available within a community, organization or society to manage and reduce disaster risks and strengthen resilience. It is important to emphasize people's capacity to anticipate, cope with, resist and recover from disasters, rather than simply focusing on the vulnerability that limits them.

Resilience: Disaster resilience is the ability of individuals, communities, organisations and states to adapt to and recover from hazards, shocks or stresses without compromising long-term prospects for development.

Disaster Risk Reduction: Disaster risk reduction involves structural and non-structural measures. Structural measures include the use of physical or engineering solutions (such as ocean wave barriers or earthquake resistant buildings) to

avoid disaster or reduce its impacts. Non-structural measures involve the use of policies, laws, education and awareness creation, and practices to avoid or reduce the impacts of disaster.

Early Warning System (EWS): EWS is a socio-technical system designed to generate and circulate meaningful warning information in a timely manner to enable a target system take a proactive response to a hazardous threat in order to avoid disaster or reduce its impacts. We emphasise “socio-technical” because an early warning system comprises all the steps from detection of the threat, through communication to target community or people, to the ability of the target to understand and respond appropriately to the warning.

Disaster Preparedness: It consists of the knowledge and capacities of institutions, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent or active hazard events or conditions.

Disaster Prevention: Disaster Prevention is the elimination or reduction of the likelihood of occurrence of natural hazard event, or their adverse impacts. Examples of disaster prevention actions include flood protection embankments.

Disaster Mitigation: It refers to a set of measures to reduce or neutralise the impact of natural hazards by reducing social, functional, or physical vulnerability.

Disaster Response: Disaster response (relief) is the provision of assistance or intervention through the emergency services during or immediately after a crisis in order to save lives, reduce further impacts on health and public safety and to meet the basic subsistence needs of affected populations.

Damage Assessment: Damage

Assessment is the process for determining the nature and extent of the loss, suffering, and/or harm to the community resulting from a natural, accidental or human-caused disaster. Damages are normally classified as:

► **Severe:** The target facility or object cannot be used for its intended purpose. Complete reconstruction is required.

► **Moderate:** The target facility or object cannot be used effectively for its intended purpose unless major repairs are made.

► **Light:** The target facility or object can be used for intended purpose but minor repairs would be necessary.

Damage Assessment:

► Crisis counselling is the process of alleviating the emotional and psychological disturbances of persons affected by disaster in order to restore a sense of control and mastery and to aid the process of recovery and reconstruction.

► Normally, disasters overwhelm the physical and psychological capacity of people to cope. This can lead to emotional and psychological disturbances which can affect a person's ability to make right decisions or adopt reasonable responsive actions.

► Crisis counselling addresses these problems and is a crucial part of recovery and reconstruction.

Needs Assessment:

► Needs assessment is a process of estimating the financial, technical, and human resources needed to implement the agreed-upon programmes of recovery, reconstruction, and risk management

► Post-damage needs assessment is normally a rapid, multi-sectoral assessment that measures the impact of disasters on the society, economy, and environment of the disaster-affected areas.

ATMOSPHERE LAYERS

Troposphere The bottom dense part, containing 70% of the mass close to the ground is troposphere. It reaches up to 11 km from the ground. Clouds, storms, fog and haze are found only in troposphere. As the height increases, the temperature of the layer also increases. The decrease in temperature with altitude is known as lapse rate. The border of Troposphere is called Tropopause (which acts like a lid over troposphere). Temperature stops decreasing with height from tropopause.

Stratosphere This is a clear layer above troposphere that extends to a height of about 50km from earth's surface. This layer does not have clouds, storms or dust. Clouds are not formed since water vapor is absent. Ozonosphere is the important layer that is found within stratosphere. Ozone(O₃) is found in this layer. Ozone absorbs and prevents harmful ultraviolet radiations from reaching earth, thereby protecting life. The maximum concentration occurs at 22km from the ground level. The temperature increases with height in stratosphere. Due to this vertical wind seldom occurs and horizontal winds are seen parallel to the earth surface, which leads to the absence of turbulence in the air. This ensures good visibility and smooth travel for jet planes. It is often seen that flying of jet planes is often responsible for the destruction of ozone layer. Above the stratosphere, there is a small layer called stratopause, where temperature neither decreases or increases with height.

Mesosphere :The portion of the atmosphere above stratosphere, between 50km and 80 km is called mesosphere. It starts from the edge of stratopause. The density of air is about 1/1000 as that of sea level. Mesosphere occurs a major role in radio communication as ionization occurs here. The

sunlight passes through this layer and convert individual molecules into charged ions. These ionized particles are concentrated as a zone in this layer and is called as D layer. The D-layer reflects the radio waves transmitted from earth. A small layer mesopause is found around the mesosphere, where temperature is stable.

Thermosphere: Thermosphere extends from 80km to around 60000km from the earth. The property of thermosphere is radically different from others. Ions are abundant in thermosphere. Here the temperature increase to about 2000°C. Ionization takes place in this layer too. Ionization of molecules results in individual charged ions, producing two ionized layers-E and F layers, which reflects radio waves. The upper thermosphere is called Magnetosphere

OZONE LAYER Ozone(O₃) is found in Stratosphere. Ozone absorbs and prevents harmful ultraviolet radiations from reaching earth, thereby protecting life. The maximum concentration occurs at 22km from the ground level. At this altitude the concentration of ozone layer is 10ppm. Ozone absorbs and prevents the harmful ultraviolet radiation from reaching earth, thereby protecting life. Due to human activities, ozone layer is becoming thin. The thinning of this layer is called ozone depletion.

Ozone-oxygen cycle The ozone layer is located in the lower part of the stratosphere between 15 km to 35 km. Concentration of ozone is maximum at about 25-30 kms. At this altitude, it's 10ppm. Beyond this, it ranges between 2 to 8 ppm. The level of ozone is maintained at this level by Ozone-Oxygen cycle. The ultra-violet radiation ejected by the sun strikes the oxygen molecule(O₂), it splits the molecules into two individual atoms(O+O).

GREEN HOUSE EFFECT The physical process that takes place in the troposphere are responsible for the weather and climate of that particular place. These processes are studied under Meteorology In order to understand the basics of Green House Effect, a few principles of Meteorology is to be known. Of these incoming and outgoing solar radiation is of main interest

WEATHER When radiation from insolation strikes earth, its top layer get heated up. The heat energy created is transferred to the overlying layers, through conduction and radiation. Due to this, as well as the earth's movement, the air moves in all directions-both horizontally and vertically. The movement of air is the basis of weather. Weather is the atmospheric condition that exists for a short a given area is an important parameter in the formation of cyclones. The main source of energy for cyclones is the warm oceans in the tropical regions. When the air move along curved isobars (the line that connects the area having equal pressure), a net centripetal acceleration pulls it towards the center of the curvature making air to rotate. Such gradient wind is called Cyclone. If the movement of gradient wind is in anticlockwise direction in duration which can span from few hours to few days.

CYCLONES The atmospheric pressure in the northern hemisphere, it is called cyclone and if it is anticlockwise in southern hemisphere, its called anticyclone. If the movement of gradient wind is in clockwise direction in the southern hemisphere, it is called cyclone and if it is clockwise in northern hemisphere, its called anticyclone.

TYPES OF CYCLONES There are three types of cyclones.
Tropical Cyclones Polar cyclones Mesocyclones
The difference between a hurricane

a cyclone, and a typhoon is the location where the storm occurs. Hurricanes, cyclones, and typhoons are all the same weather phenomenon; we just used different names for these storms in different places. In the Atlantic and Northeast Pacific, the term "hurricane" is used. The same type of disturbance in the Northwest Pacific is called a "typhoon" and "cyclones" occur in the South Pacific and Indian Ocean. The reason for these storms include a pre-existing weather disturbance, warm tropical oceans, moisture, and relatively light winds. If the right conditions persist long enough, they can combine to produce the violent winds.

TROPICAL CYCLONE Tropical cyclones are cyclones that originates over oceans in tropical areas and coastal regions. Tropical region are the region of the earth near to the equator, with Tropic of cancer in the northern hemisphere and Tropic of Capricorn in the southern hemisphere. Tropical cyclones are known by different names, depending on regions. In the Indian ocean, they are known by simply cyclones, if you go to the western pacific side or south pacific side, it is known as typhoons, likewise in western Australia, it is called Willy willies. All these are different names refers to the same type of storm. Wind movements is determined by low pressure and high pressure systems

Coriolis force Due to the rotation of the earth a force is generated and it acts perpendicular to the direction of motion and to the axis of rotation. When the earth (which is spherical) is spinning in its axis from west to east, the speed of the surface of the earth at equator is much faster than the speed at the poles. So if anything has to come straight from poles to the equator, it will get deflected to the right in the Northern hemisphere and to the left in the Southern Hemisphere

POLAR CYCLONES Polar cyclones are known as Arctic cyclones which are large areas of low pressure. It occurs in polar region like Greenland, Siberia and Antarctica. Unlike Tropical Cyclones, Polar Cyclones are usually stronger in winter months. Polar cyclones are usually 1,000 to 2,000 kilometers wide in which the air is moving in a spiral counterclockwise fashion in the northern hemisphere. The reason for the rotation is the same as tropical cyclones, the Coriolis effect. They also exist in places such as Greenland, the Eurasian Arctic area, and northern Canada, with about 15 cyclones per winter. Polar cyclones can form in any time of the year, although summer polar cyclones are usually weaker than the ones that form in the winter.

MESOCYCLONE A mesocyclone is a storm-scale region of rotation (vortex) of air, approximately 2 to 10 miles in diameter, within a convective storm. In a mesocyclone, air rises and rotates around a vertical axis, usually in the same direction as low pressure systems. They are most often associated with a localized low-pressure region within a severe thunderstorm. Mesocyclone is a cyclone that occurs when part of a thunderstorm cloud starts to spin, which may eventually lead to a tornado. 'Meso' means 'middle'. Counterclockwise in the northern, and clockwise in the southern hemisphere.

INDIAN MONSOON Monsoon is a regional wind that blows towards land at a certain season and blows from the land masses during other seasons. These winds blow in opposite directions in summer and in winter. The Indian subcontinent has two monsoons. The south-west monsoon The north-west monsoon ***South-west monsoon*** It originates from the southern hemisphere in Indian Ocean. When these winds cross the equator, they get reflected

towards right by Coriolis force, becoming south-west trade winds. These winds gather large amount of moisture as they travel across Indian ocean. As the south-west monsoon approaches the Indian peninsula, it is diverted into two Arabian-Sea Branch and Bay of Bengal Branch. When the moisture laden Arabian Sea branch reaches south-western side of India, they are blocked by the Western Ghats. When the mountain range blocks the horizontal flow, the winds ascend around the slope of the mountain range, get cooled down and form clouds. ***North-eastern monsoon*** The Inter-Tropical Convergence Zone appears as a band of clouds consisting of showers, with occasional thunderstorms, that encircles the globe near the equator. The ITCZ moves to the south of equator, when the position of the sun shifts to the southern hemisphere. This leads to the reversal of winds and wind blows from north-eastern direction towards ITCZ. These winds are called north-east monsoon winds or north-east trade winds. They originate from the land masses of the north-eastern region of India and are relatively dry. When they pass over Bay of Bengal towards south, they pick up moisture and cause rainfall over parts of Andhra and Tamil Nadu. Cyclone formation is common during these times. And abundant rainfall occurs.

HYDROSPHERE Hydrosphere forms over 70% over the earth's surface. Water is found in oceans as well as on land. Life made possible on earth, due to availability of water. The hydrosphere has direct influence on climate and weather conditions on earth. This is due to worldwide oceanic circulations. The average depth of ocean is about 3.7 kms. Floor of ocean has mountain ranges and valleys, isolated volcanic peaks and vast plains

