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Tornadoes

Tornado is a narrow, violently rotating column of air that extends from a thunderstorm to the ground.The most destructive meso-scale convective phenomenon which builds up in a thunderstorm is the tornado. Tornadoes are extremely severe vortices of very small dimensions occurring in association with intense and large Cb clouds or cyclonic storms. The visible symptom of a tornado is a funnel shaped cloud tapering from the base of a thunderstorm. It sometimes touches the ground and causes extensive damage along its path. The diameter of the tapering end touching the ground may vary from less than a meter to a few tens or hundreds of meters.With the available network of meteorological observations, it can hardly be detected. It has not been possible to measure the meteorological parameters associated with tornadoes due to the above limitations. The exact cause of the tornado formation is not yet fully understood. The wind speeds can be as high as 400 to 500 kmph. The entire disturbance moves at a speed varying between 100 to 150 Kmph. In view of its severe intensity, it has a high potential for destruction. The most probable regions of tornado occurrence in India are Assam and adjoining states, West Bengal, Orissa and Gangetic plains, Punjab and Haryana. The entire life cycle of local severe storms from birth to dissipation is only a few hours.The severe storms being small in size with a short life span often escape detection on a synoptic weather chart with the existing network of observatories.

Special observing aids and techniques of detecting are necessary in addition to the routine weather charts. The advance warning of tornadoes is a difficult task. The radar comes in quite handy for tornado monitoring and warning. Unless the warning of tornado occurrence is disseminated to public at large, due to its short life, adequate steps cannot be taken by public to get away from the path of tornado.Various State Governments in the target region have promulgated building laws which specify design of houses capable of withstanding tornado fury.

Heat Waves and Cold Waves

The human body is acclimatised to a particular combination of temperature and humidity. Long exposure to extremes of cold or heat may lead to severe thermal strain and ultimately to death. This needs monitoring of daily minimum temperature in winter and daily maximum temperature in summer.During March to July, normal temperatures over most parts of India are very high. Any abnormal increase leads to disastrous consequences. In each season we may expect two or three hot spell with temperatures much above the normal. Similarly, during the period November to March, when the winter is in full swing, two to three cold spells may be experienced. Both the hot and cold spells appear to migrate from one areato another, though their movement is not systematic. The heat and cold spells are called heat waves and cold waves respectively,though they have nothing in common with wave motion as is normally understood. Widespread heat waves normally occupy about 10 percent of the Indian land mass.

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Snow Avalanche

Snow Avalanche is a slide of snow mass down a mountainside. It is a rapid, down slope movement of large detached mass of snow, ice and associated debris such as rock fragments, soil and vegetation. Remediation practices, including slope geometry correction, providing protection to the toe of slope by retaining structures, management of the surface and sub-surface water including the development of pore pressures, nailing, bolting, anchoring, micro piling, application of geo-grids and geo-textiles and afforestation,constitute powerful elements of most geotechnical packages commonly used for improving the stability of problematic slopes and landslide sites in India.

Avalanche mitigation can be divided into two categories - structural and non-structural. Non-structural methods include avoidance (through land use restrictions or temporary evacuation) and artificial triggering. Structural measures include diversion structures, dams, retarding structures and starting zone structures design to prevent avalanche initiation. Forest management can also be used to mitigate avalanche hazards.

Sea Erosion

The mitigation of coastal erosion is a difficult task since a number of parameters and processes are involved in the same. There are a number of mitigation methods both hard and soft, available for mitigating erosion. Hard options are expensive, not eco-friendly and usually massive in size. For example, seawalls, bulkheads, revetments, groins, jetties etc. They are normally made of materials like rubble mound, concrete, etc. Most of the hard options, for example seawalls, have been found to be interfering with local wave hydrodynamics and sediment movement, cause up-drift accretion, down-drift erosion, harm to swimmers, divers, and to marine life.

In contrast, soft options are usually not expensive,not massive in size, and mostly eco-friendly. These are options like sand bypassing, dune rehabilitation,dune vegetation, beach face dewatering, sand fencing,green belts, Biorock, geotubes, geotextile sand containers etc., which are being used extensively these days in place of hard options. There are also pro-active methods such as flood proofing, setback limits, zoning, relocation, abandoning, demolition, do nothing etc., which are used similar to soft options.