

CPP (CITY PROTECTION PLAN) Portal Presents

Frequently Asked Questions *On* *Cyclones*

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The word cyclone has been derived from Greek word 'cyclos' which means 'coiling of a snake'. The word cyclone was coined by Heary Piddington who worked as a Rapporteur in Kolkata during British rule. The terms "hurricane" and "typhoon" are region specific names for a strong "tropical cyclone". Tropical cyclones are called "Hurricanes" over the Atlantic Ocean and "Typhoons" over the Pacific Ocean.

What is Cyclone?

A cyclone is a storm accompanied by high speed whistling and howling winds. It brings torrential rains.

Where does a cyclone come from?

A cyclonic storm develops over tropical oceans like the Indian Ocean and Bay of Bengal and the Arabian Sea. Its strong winds blow at great speed, which can be more than 118 kilometers per hour.

What are the visible signs of a cyclone?

When a cyclonic storm approaches, the skies begin to darken accompanied by lightening and thunder and a continuous downpour of rain.

How does a cyclone affect us?

- (1) Cyclone causes heavy floods.
- (2) It uproots electricity supply and telecommunication lines.
- (3) Power supply shuts down and telephones stop functioning.
- (4) Road and rail movements come to halt because floods damage rail tracks and breach roads.
- (5) Rail movements are also disrupted because of communication failure.
- (6) The inclement weather conditions also disrupt Air services.
- (7) Seaports stop work due to high winds, heavy rains and poor visibility.
- (8) Sometimes ships overturn or are washed ashore.
- (9) The high speed winds bends and plucks out trees and plants.
- (10) Cyclone tears away wall sidings and blows off roofs of houses.
- (11) Houses collapse and people are rendered homeless.
- (12) In villages kachha houses get blown away.
- (13) The speeding winds cause loose metal and wooden sheets to fly turning them to potential killers. Broken glass pieces can cause serious injuries.

- (14) The floodwaters can take time to recede.
- (15) The floodwaters can turn the fields salty.
- (16) Bridges, dams and embankments suffer serious damages.
- (17) Floods wash away human beings and animals and make water unfit for drinking. There can be outbreak of diseases like Cholera, Jaundice or Viral fever due to intake of impure water. Water gets contaminated because of floating corpses of animals and human beings and mixing of sewage stored food supplies, get damaged.

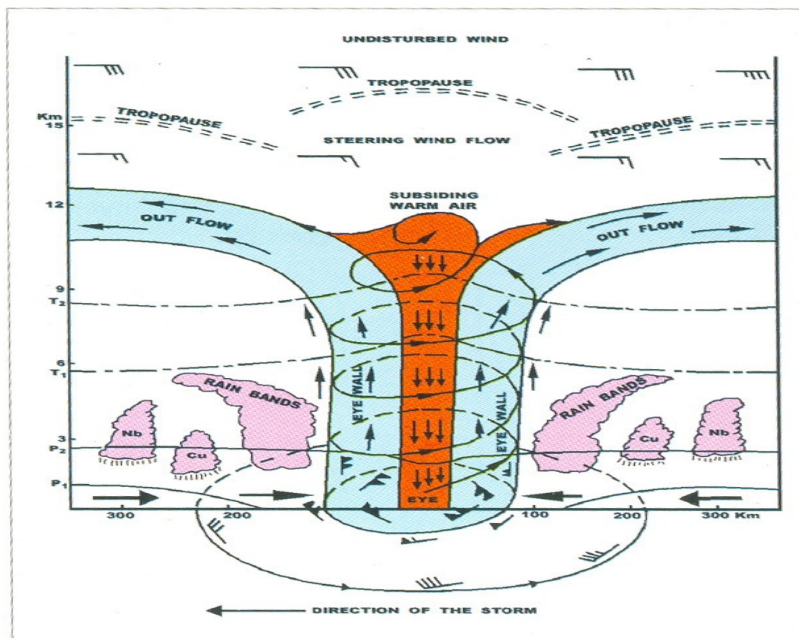
Are all cyclonic storms equally dangerous?

No, all cyclonic storms are not equally dangerous. More the pressure drop at the central region more will be the severity of the storm. The cyclonic storms are generally categorised according to the maximum wind associated with the storm. If the maximum wind is between 34 - 47 knots (about 60-90 kmph) it is called a Cyclonic storm. Severe Cyclonic storm will have maximum wind speed between 48 - 63 knots (about 90-120 kmph).

If the maximum wind is 64-119 knots it will be called a very severe Cyclonic storm and when the wind is 120 knots and above it will be called super cyclonic storm. There is very little association between intensity (either measured by maximum sustained winds or by the lowest central pressure) and size (measured by radius of gale force winds).

What is the wind structure in a cyclone?

The ideal wind and cloud distribution in a cyclone is shown in the following figure.



The band of maximum winds may vary between 10 and 150 Km. In this belt, speed decreases rapidly towards the eye of the cyclone. But it decreases slowly and in an irregular fashion outward from the eye wall.

How many cyclones cross different coastal states of India?

The frequencies of cyclonic storms crossing different coastal states of India during 1891-2006 are shown in the figure below. The frequency of severe cyclonic storms is maximum for Andhra Pradesh while that of cyclone is maximum for Orissa. Considering west coast only, Gujarat is most vulnerable.

Which tropical cyclone over north Indian Ocean have caused the most deaths and most damage?

The death toll in the infamous Bangladesh Cyclone of 1970 has had several estimates, some wildly speculative, but it seems certain that at least 300,000 people died from the associated storm tide (surge) in the low-lying deltas.

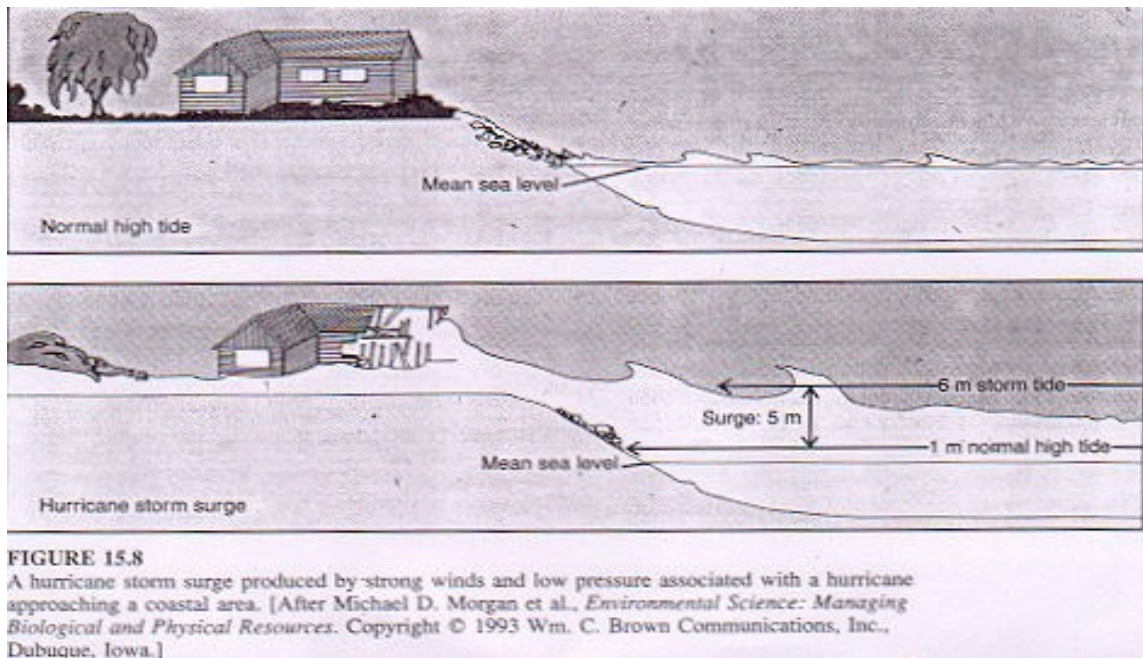
What are the causes of disaster during cyclone?

The dangers associated with cyclonic storms are generally three fold.

- i. Very heavy rains causing floods.
- ii. Strong wind.
- iii. Storm surge.

What are the largest rainfalls associated with tropical cyclones over north Indian Ocean?

The rainfall can vary from trace/ nil rainfall when the system moves skirting the coast to maximum rainfall upto 50-60 cm per day. In the recent super cyclone which crossed Orissa coast near Paradip on 29th October 1999, Para dip recorded 24 hr cumulative rainfall of about 52 cm at 0830 IST of 30th October 1999.



What may be the wind speed in most severe storm?

The wind speed may be as high as 300 kmph.

What is a Storm Surge?

Storm Surge is an abnormal rise of sea level as the cyclone crosses the coast. Sea water inundates the coastal strip causing loss of life, large scale destruction to property & crop. Increased salinity in the soil over affected area makes the land unfit for agricultural use for two or three seasons.

Storm surge depends on intensity of the cyclone (Maximum winds and lowest pressure associated with it and Coastal bathymetry (shallower coastline generates surges of greater heights).

In which direction of a storm the surge will appear?

The on shore wind gives rise to storm surge. Thus the forward right sector of a storm gives rise to storm surge.

What is storm tide?

The storm tide is the combination of storm surge and the astronomical tide.

What is the vulnerability our coastline from the point of view of storm surge potential?

Entire Indian coast can be categorized into 4 zones

- Very high risk zones (Surge height > 5m)
- High risk Zone (Surge height between 3-5m)
- Moderate risk zone (Surge height between 1.5 to 3m)
- Minimal risk zone (Surge height < 1.5m)

Accordingly

- The coastal areas and off-shore islands of Bengal and adjoining Bangladesh are the most storm-surge prone (~ 10-13m) – VHRZ
- East coast of India between Paradip and Balasore in Orissa (~ 5-7m) – VHRZ
- Andhra coast between Bapatla and Kakinada holding estuaries of two major rivers Krishna and Godavari (~ 5-7m) – VHRZ
- Tamilnadu coast between Pamban and Nagapattinam (~ 3-5m) – HRZ
- Gujarat along the west coast of India (~ 2-3m) -MRZ

Which tropical cyclone has produced the highest storm surge?

The Bathurst Bay Hurricane, also known as Tropical Cyclone Mahina, struck Bathurst Bay, Australia in 1899. It produced a 13 m (about 42 ft) surge, but other contemporary accounts place the surge at 14.6 m (almost 48 ft). Considering cyclones over north Indian Ocean, cyclone of 1970 has produced maximum storm surge of 13 metres in recent years. Some of the significant storm surges (metres) over the region are mentioned below.

Hooghly river (WB), October, 1737 : 13

Contai (WB), October, 1864 : 10-13

Bangladesh cyclone, November, 1970 : 13

Paradip, Orissa, October, 1971 : 4-5

Balasore Orissa, May, 1989 : 3-6

Orissa Super Cyclone, October, 1999 : 5-6

What are fast and slow moving cyclones?

When the speed of movement is 10-14 kmph, it is called as slow moving cyclone. It is called as moderately moving cyclone, if the speed of movement is 15-25 kmph. If the speed of movement is more than 25 kmph, is called as fast moving cyclone.

What is 4-stage warning system for Tropical Cyclones?

Expectations of Disaster Managers are longer lead time and improved accuracy of landfall forecast. But the present state of art has limitations to make the above requirements go hand in hand. Lead time depends on the formation and duration of cyclone itself which may vary considerably from one cyclone to another. However, since pre-monsoon cyclone season of 1999, IMD introduced a 4-Stage warning system to issue cyclone warnings to the disaster managers. They are as follows:

(1) Pre-Cyclone Watch

Issued when a depression forms over the Bay of Bengal irrespective of its distance from the coast and is likely to affect Indian coast in future. The pre-cyclone watch is issued by the name of Director General of Meteorology and is issued at least 72 hours in advance of the commencement of adverse weather. It is issued at least once a day.

(2) Cyclone Alert

Issued atleast 48 hours before the commencement of the bad weather when the cyclone is located beyond 500 Km from the coast. It is issued every three hours.

(3) Cyclone Warning

Issued at least 24 hours before the commencement of the bad weather when the cyclone is located within 500 Km from the coast. Information about time /place of landfall are indicated in the bulletin. Confidence in estimation increases as the cyclone comes closer to the coast

(4) Post landfall outlook

It is issued 12 hours before the cyclone landfall, when the cyclone is located within 200 Km from the coast. More accurate & specific information about time /place of landfall and associated bad weather indicated in the bulletin. In addition, the interior distraction is likely to be affected due to the cyclone are warned in this bulletin.







What is port warning?






















The strong winds and high seas pose dangers to port. Moreover if a storm is at high seas the ships moving out of the port may fall into danger. Therefore the port is informed accordingly and advised to hoist signals which can be seen by mariners both during day and night. There are eleven such signals.





The significant features of this warning are as follows.

- Port officers are warned about disturbed weather likely to affect their Ports by IMD.
- On receipt of warnings, Port officials hoist appropriate visual signals so that they are visible from a distance.
- Ports are warned 5 to 6 times a day during period of cyclonic storm.
- Warning contains information about location, intensity, expected direction, expected landfall point and type of signal the Port should hoist.
- Uniform system of storm warning signals introduced from 1st April 1898.

PORT WARNINGS

Signal/ Flag No.		NAME	Symbols		Description
			Day	Night	
1.	Distant bad weather	DC1			Depression far at sea. Port NOT affected.
2.		DW2			Cyclone far at sea. Warning for vessels leaving port.
3.	Local bad weather	LC3			Port Threatened by local bad weather like squally winds.

4.		LW4	 		Cyclone at sea. Likely to affect the port later.
5.	Danger	D5	   		Cyclone likely to cross coast keeping port to its left
6.					
7.		D6	       		Cyclone likely to cross coast keeping port to its right.
		D7			Cyclone likely to cross coast over/near to the port.
8.		GD8		 	Severe cyclone to cross coast keeping port to its left
9.		GD9	 	 	Severe cyclone to cross coast keeping port to its right

10.	Great danger	GD10			Severe cyclone to cross coast keeping port to its right.
11.		XI			<u>Communication failed with cyclone warning office.</u>

What are fishermen warning?

A fisherman warning is warning message for fishermen who ply on coastal areas or may go out at sea. Dangers to fisherman due to storm are strong winds and associated high seas, due to which fishing boats may capsize.

Who are the recipients of Cyclone Warnings?

Warnings are issued for general public, fishermen, farmers and different categories of users such as central and state government officials responsible for disaster mitigation and relief, industrial and other establishments located in the coastal areas, ports, coastal shipping, railways, aviation, transport, communication and power authorities.

What is relation between kmph and knots (or m/s) ?

For winds:

1 mile per hour = 0.869 international nautical mile per hour (knot)

1 knot = 1.852 kilometers per hour

1 knot = 0.5144 meter per second

1 meter per second = 3.6 kilometers per hour

Which areas are exposed to a cyclone in Gujarat?

In Gujarat, the Saurashtra-Kachchh region experiences a cyclone. The port towns of Veraval, Porbandar, Jamnagar, Dwarka, Okha, Kandla and Bhavnagar and other minor port towns suffer most.

Does a cyclone follow a particular path?

It is often difficult to predict where a cyclone will strike.

When it starts moving from oceans (in Gujarat it is Arabian Sea) towards the land area, a cyclone can change track and hit areas other than those anticipated earlier.

Has any early warning system been evolved for the occurrence of a cyclone?

Yes. In India, the Indian Meteorological Department has developed a four-stage warning system for a cyclone.

How does the system operate?

This warning is about the possibility of a cyclone when a low pressure depression develops in oceans. For Gujarat, the development of such a depression in the Arabian Sea is indicative of a cyclone attack.

The Alert stage

This warning is given 48 hours prior to the time when a cyclone is expected to hit the land.

The Warning stage

This is the stage when a cyclone gets formed. The warning is given 24 hours before the anticipated time of arrival of a cyclone.

Cyclone arrival

This warning is issued 12 hours before a cyclone is due to hit the land. The warning gives information about cyclone and will continue until the winds subside. In sea ports, danger signal are hoisted about the impending cyclone.

From where can people access cyclone storm warnings?

Warnings about storms, their intensity and the likely path they may take are regularly broadcasted by radio and television network continuously until the storm passes over.

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If you want to get more information about it please contact CPP Portal.

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