

StormSurge

Bureau of Meteorology

PREPAREDNESS AND SAFETY

Around the world, drowning by storm surge accounts for a high proportion of the deaths in tropical cyclones.

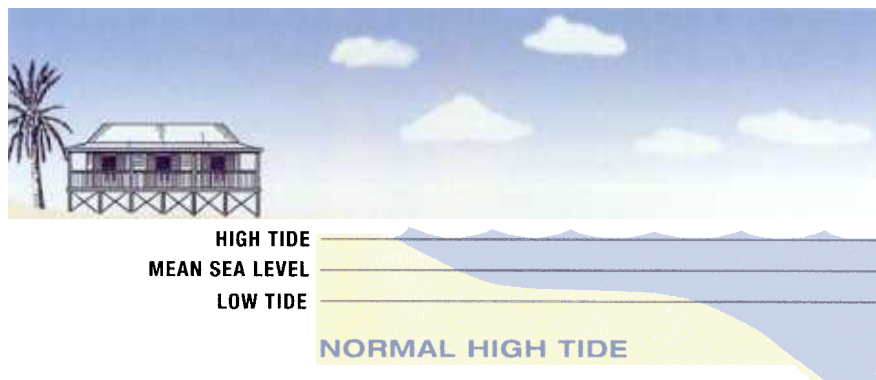
In 1970, a severe tropical cyclone struck the coast of Bangladesh and over 300,000 people were drowned by the storm surge. Many parts of the Australian coastline are vulnerable to storm surge and Australians have been killed in past storm surge events.

What is Storm Surge?

A storm surge is a rise above the normal water level along a shore that is the result of strong onshore winds and /or reduced atmospheric pressure. Storm surges accompany a tropical cyclone as it comes ashore. They may also be formed by intense low-pressure systems in non-tropical areas

The combination of storm surge and normal (astronomical) tide is known as a 'storm tide'. The worst impacts occur when the storm surge arrives on top of a high tide. When this happens, the storm tide can reach areas that might otherwise have been safe. On top of this are pounding waves generated by the powerful winds.

The area of sea-water flooding may extend along the coast for over 100 kilometres, with water pushing several kilometres inland if the land is low-lying.



Storm Surge + Normal Tide = Storm Tide

The combined effects of the storm tide and waves can knock down buildings, wash away roads and run ships aground. If you are caught in your home or in a car when a significant storm surge arrives, you may not survive.

The paths of cyclones are often erratic, which makes it hard to forecast exactly when and where a cyclone will cross the coast. This makes it difficult to predict how high the astronomical tide will be when the storm surge strikes, since the time difference between high and low tide is only a few hours. As a result, the Bureau of Meteorology, in its warnings to the public, makes the 'worst case' assumption that the cyclone will cross the coast at high tide.

Had Cyclone Tracy arrived in Darwin during a high tide, the devastation would have been even worse. Similarly, a low tide saved Townsville from a dangerous storm surge that accompanied Cyclone Althea in 1971.



Richelieu Apartments before and after Hurricane *Camille*. A seven metre storm surge devastated all in its path (Pass Christian, Mississippi, August 1969)



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How high will the Storm Surge be?

Every cyclone that affects the coast produces a storm surge. But not all storm surges rise to dangerous levels.

The height of the surge depends on:

- The intensity of the cyclone - as the winds increase, the sea water is piled higher and the waves on top of the surge are taller.
- The forward speed of the cyclone - the faster the cyclone crosses the coast, the more quickly the surge builds up and the more powerfully it strikes.
- The angle at which the cyclone crosses the coast - in general, the more head-on the angle, the higher the surge. However other angles can lead to local zones of enhanced surge in areas such as narrow inlets and bays.
- The shape of the sea floor - the surge builds up more strongly if the slope of the sea bed at the coast is shallow. If the sea bed slopes steeply, or if fringing reefs are present, then the surge will be less.
- Local topography - bays, headlands and offshore islands can funnel and amplify the storm surge.

What should I do?

You need to plan well ahead of time

Are you under threat?

If you live or work in the coastal tropics or subtropics, find out from your local Emergency Services or local council whether you are in a surge-prone area. If you are, decide where you will go in the event of a storm surge. You might have a friend living on higher ground with whom you could go and stay. Wherever your nearest safe high ground shelter might be, work out the safest way to get there.

Are you ready to evacuate?

Now is the time to plan for what you will do in the event of evacuation. Will you have essential medicines? What about vital documents? What will you do with your pets? Talk with your local council or Emergency Services about what you plan to do.

Time to evacuate!

Be prepared to evacuate as soon as you are advised to do so. This makes it easier for Emergency Services to manage the difficult task of moving a lot of people all at once, especially if the weather is getting worse. If you choose to leave of your own accord, tell your neighbours. .

When a cyclone threat develops, keep listening to official warnings issued by the Bureau of Meteorology. These will advise if high tides and coastal flooding are expected.



Erosion which occurred during Severe Tropical Cyclone Vance near Exmouth, 1999.



Before and during a Storm Surge in Port Hedland, 1939

More Information

If you would like more information on Storm Surge, please contact the Bureau of Meteorology or State/Territory Emergency Services office nearest to you.

Further information on Storm Surge is also available on the Bureau of Meteorology web site at www.bom.gov.au