

# Tropical Cyclones

## NATURAL HAZARDS IN THE PACIFIC - FACT SHEET 1



SOPAC

### Reducing Vulnerability of Pacific ACP States



Tropical cyclones (also known as typhoons or hurricanes) affect nearly all Pacific island countries and are the most frequent hazard to affect the region, with around 7-8 cyclones occurring every year. As a result of climate change cyclone frequency has doubled in the last decade. The cyclone season in the southern hemisphere runs from October to May and in the northern hemisphere from May to October but some cyclones do occur outside the season.

### Tropical Cyclone Hazards

Strong winds can continue for hours, days even, causing widespread damage to buildings, infrastructure and vegetation and causing loss of life. Wind speed levels of a tropical cyclone are:

- Gale force winds: 63-87 km/h
- Storm force winds: 88-117 km/h
- Hurricane force winds: 117+ km/h

**Torrential rains** can result in widespread flash flooding and river flooding. Up to 600 mm and more of high intensity rain can be produced in one day. These rains can also trigger landslides in hilly areas, which may already be sodden due to previous rains.



Satellite view of a tropical cyclone.

Image source: US National Geophysical Data Center [www.ncdc.noaa.gov](http://www.ncdc.noaa.gov)

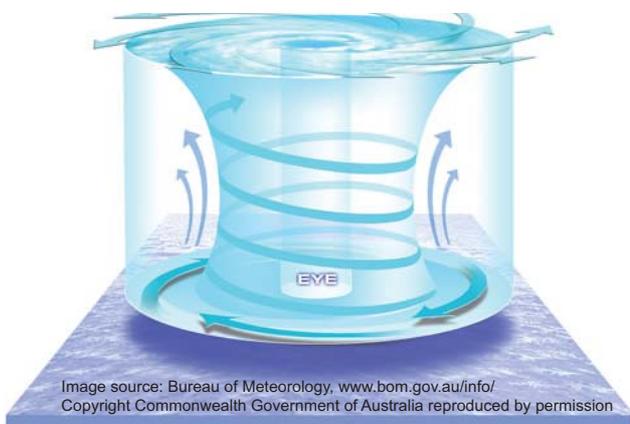
### What is a Tropical Cyclone?

A tropical cyclone is a violent rotating windstorm that develops over warm tropical waters warmer than 26.5 °C and located between 5° and 15° latitude.

**EXAMPLE:** Although Cyclone Dani skirted past Fiji in 1999, it brought with it torrential rains that caused severe flash flooding, devastating western Viti Levu and killing seven people.

**Storm surges and waves** created by low atmospheric pressure and strong cyclonic winds blowing over long distances. A storm surge is a raised dome of seawater about 60-80 km wide and 2-5 m higher than normal sea level. As the cyclone makes landfall, storm surge and waves inundate coastal areas. At the coast, storm surge and waves are the greatest threat to life and property and also cause severe coastal erosion. In low-lying atolls, a surge may inundate the whole island.

Further **Saltspray** and **Lightning** can cause considerable damage to crops, forests and infrastructure.

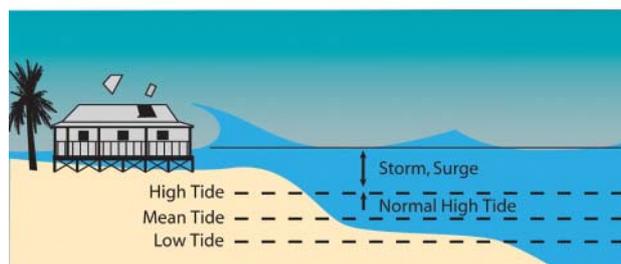


Structure of a Cyclone.

Cyclones begin as thunderstorms, which due to the Earth's spin revolve clockwise in the southern hemisphere and anticlockwise in the northern hemisphere.

These storms rise up to 10 km into the atmosphere and can be up to 2000 km across. As the cyclone becomes organised, a calm clear area called the 'eye' forms at its centre. The eye is typically 10-50 km wide and is surrounded by a dense ring of cloud known as the eye wall, which marks the belt of strongest winds.

Tropical cyclones can persist for many days and follow unpredictable paths, however in the South Pacific they usually move southeast. The warmth of the tropical waters provides the energy to fuel cyclones. As a result, they tend to weaken and dissipate as they move over significant island landmasses or cooler waters further south, forming rain depressions.



**EXAMPLE:** When Cyclone Bebe hit Funafuti in Tuvalu in 1972, it caused a 4 m surge that swept entirely across the islet causing total devastation. In 2004, Cyclone Heta brought huge storm waves crashing over 20 m high cliffs at the Alofi coast of Niue.



**EXAMPLE:** Cyclone Heta smashed up a four tonne coral boulder and deposited it up a 20m cliff in Nauru. All houses in its path were destroyed.



**EXAMPLE:** Storm surge, Cook Islands during Cyclone Heta. This cat. 5 cyclone affected Samoa, Tonga, Niue and the Cook Islands in January 2004.

Image source: Geoff Mackley

## Cyclone Warning

There is a well established network of cyclone warning centres throughout the region. Places like the Regional Specialised Meteorological Centre (RSMC) in Nadi monitor, track and name tropical cyclones as well as provide warning services to Pacific island countries. Similar services are provided for Papua New Guinea and Solomon Islands by the Australian Bureau of Meteorology's Tropical Cyclone Warning Centres. French-speaking countries are looked after by Meteo-France and American affiliated states by the National Oceanic Atmospheric Administration (NOAA).

## For more information about tropical cyclones and warning systems see the following links:

**Regional Specialised Meteorological Centre-Nadi:**

[http://www.met.gov.fj/about\\_RSMC.htm](http://www.met.gov.fj/about_RSMC.htm)

**Brisbane Tropical Cyclone Warning Center:**

<http://www.bom.gov.au/weather/qld/cyclone/>

**US Navy Joint Typhoon Warning Centre**

<http://www.npmoc.navy.mil/jtwc.html>

## CYCLONE SEVERITY: SAFFIR-SIMPSON HURRICANE SCALE

Category	Wind Speed (km/h)	Damage	Storm Surge (m)
1	119-153	Minimal: No real damage to buildings. Coastal road flooding and minor pier damage.	1-1.5
2	154-177	Moderate: Damage to roof, window, door. Piers, shrubs damaged, trees felled. Coastal and low-lying escape routes flood. Craft break moorings.	1.5 - 2.5
3	178-209	Extensive: Structural damage to houses, utility buildings. Shrubs stripped, large trees felled. Low-lying escape routes cut off. Terrain less than 1.5 m above sea level flooded. Coastal evacuation.	2.5 - 3.5
4	210-249	Extreme: Extensive curtainwall failures, roofing failures on small houses. Extensive damage - doors, windows. Low-lying escape routes cut off. Major damage to lower floors of nearshore structures. Terrain lower than 3 m above sea level may flood. Massive evacuation up to 10 km inland.	3.5 - 5.5
5	>250	Catastrophic: Complete roof failures, some complete building failures, utility buildings blown away. Severe and extensive window and door damage. Low-lying escape routes cut off. Major damage to lower floors of all structures less than 4.5 m above sea level. Massive evacuation up to 16 km inland.	> 5.5

## What you can do before, during and after a cyclone

### PRE-SEASON PREPARATIONS

- Be aware of Cyclone Warning Systems.
- Check your house for structural weaknesses.
- Identify the safest room in your house.
- Clear your property of loose objects/material that could blow about during extreme winds. Trim tree branches away from windows and power lines.
- In case of a storm surge warning know the nearest safe high ground and the safest access route to it.
- Prepare an emergency kit for the family containing a portable radio with spare batteries, torch, fuel lamp, candles, matches, water containers, canned food with opener, spare clothes, masking tape for windows and plastic bags.
- Clear all drains and waterways on the property.
- Ensure houses have proper provision for earthing lightning.

### UPON HEARING A CYCLONE WARNING

- Listen to your radio for further information.
- Fill water containers and fuel car (if you have one).
- Store or tie down all loose objects in the house.
- Batten down roof. Fix any loose parts of the house.
- Close off shutters. If you live in a flood-prone area take flood precautions.
- Ensure all the members of your family are present; keep children away from swollen drains and waterways.
- If your house is not structurally safe, prepare to move to the nearest evacuation centre.
- Collect firewood and keep in a dry place.

### DURING THE CYCLONE

- Disconnect all electrical appliances but listen to your battery radio for further information.
- Open louvres on side away from wind to reduce the pull force of the wind on the roof.
- Remain calm, stay indoors but clear of doors and windows. Remain in the strongest part of the building.
- Only use the telephone for very urgent calls.
- If the building breaks up, protect yourself with rugs or mattresses under a strong table/bench or hold onto a solid fixture (e.g. a water pipe).

### BEWARE THE EYE OF THE STORM:

If the cyclone eye passes over a sudden lull in winds occurs and may last up to 2 hours. The other side of the cyclone then hits and winds resume with equal strength but blowing from the other direction. It is vitally important to remain in shelter during and after the eye passes.

### AFTER THE CYCLONE WIND STORM HAS PASSED

- Don't go outside until officially advised it is safe.
- Do not attempt to drive and don't allow children to roam around outside.
- Beware of fallen power lines, damaged buildings, trees or flooded waterways.
- Listen to your radio for advice and updates.