

Tsunami

NATURAL HAZARDS IN THE PACIFIC - FACT SHEET 3



Reducing Vulnerability of Pacific ACP States

The most tragic and devastating tsunami in recent history occurred on 26th December 2004 just off the Indonesian province of Banda Aceh. Waves up to 30 m high battered the coastlines of Indonesia, Thailand, India, Sri Lanka and the Maldives, leaving about 300,000 people dead or missing. Whilst destructive tsunamis such as this are relatively infrequent, tsunamis are common in the Pacific Ocean and can affect all of the Pacific island countries. This is because the Pacific basin is surrounded by the

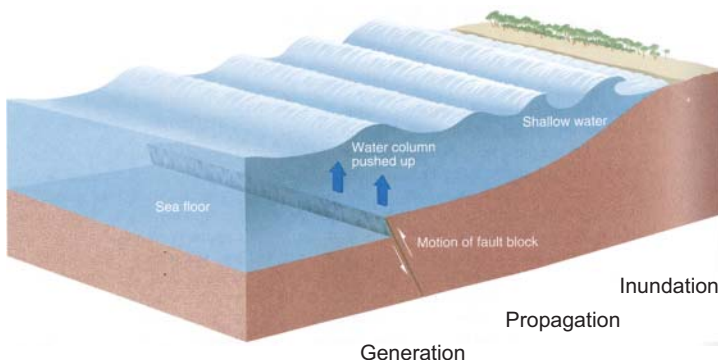
“Ring of Fire”, a series of tectonic plate boundaries associated with high earthquake and volcanic activity.



Artist's impression of a Tsunami

What is a Tsunami?

A tsunami (a Japanese word meaning “harbour wave”) is a series of waves, travelling at speeds of over 800 km/h in the deep ocean and often going unnoticed. They travel harmlessly until they reach the shallow water of a coastline where they slow down and steepen, cresting to heights of more than 10 m and can crash with devastating force across the shore, flooding low-lying areas and causing death and severe destruction.

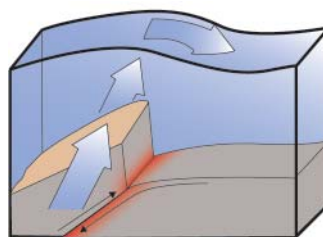


Any disturbance that shifts a large volume of water away from its normal position can generate a tsunami. The most common cause of a tsunami is an offshore earthquake, which can cause the sea floor to abruptly lift or subside. This can disturb the overlying water column and possibly lead to a tsunami.

EXAMPLE: The 2004 Indian Ocean tsunami was caused by an earthquake as was the 2002 Port Vila, Vanuatu tsunami and the 1999 Pentecost Island, Vanuatu tsunami.

Similarly, a submarine volcanic eruption creates an upward force that lifts the water column above the volcano leading to the generation of a tsunami. A submarine landslide can also generate a tsunami from the sudden down-slope movement and the slumping of sea floor sediments. These landslides are most often the result of an earthquake and are occasionally due to a volcanic eruption. In addition, coastal landslides and volcanic cone collapses that send tons of debris spilling into the water can also result in tsunami.

EXAMPLE: Earthquakes triggered the submarine landslides that caused the 1998 Aitape, Papua New Guinea and the 1953 Suva, Fiji tsunami.



Earthquake and landslide caused tsunamis

EXAMPLE: In 1958 a huge landslide Lituya Bay, Alaska, generated an enormous tsunami 525 m high and in Ritter, Papua New Guinea, a major volcanic cone collapse caused a tsunami 12-15 m high, wiping out a number of villages in western New Britain, Papua New Guinea.

Tsunami Hazards

Coastal inundation and erosion. Tsunami can severely impact coastal areas, completely inundating low-lying coastal areas, destroying buildings, damaging infrastructure, flattening trees, churning up soil and even washing away entire villages. The inundation can also cause severe coastal erosion and affect areas upstream from the coast since tsunami waves can travel up rivers and streams from the ocean.

Wave speed/force. Tsunami waves travel at 36-54 km/h in shallow water, faster than most people can run. This enormous momentum means that the force of the waves can move large rocks weighing several tons, along with boats and other debris. People can be caught up in the wave and tossed about, choking on seawater and suffering injuries due to the debris.

Debris. During major tsunami, fatalities and damage result not only from the force of the waves themselves, but also from the accompanying debris churned up as the wave surges across the shore, such as broken glass, torn metal, parts of buildings and uprooted trees.

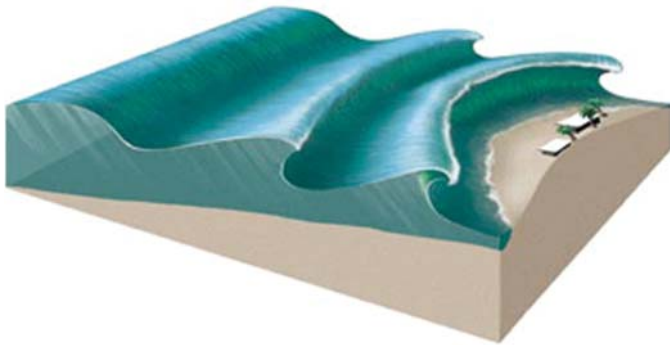
EXAMPLE: 17 July 1998. Three catastrophic tsunami waves hit the coast of Aitape, Papua New Guinea, penetrating up to 1 km inland, devastating villages. Along the 25 km strip from Sisano to Malol, wave heights reached between 10 and 15 m. Over 2000 lives were lost. This picture shows the sand spit where Arop Village once stood.



Image source: US National Geophysical Data Center

Backwash. Another danger from Tsunami waves is that they bring a large volume of seawater onto the land. When the water flows back out it may carry people out to sea.

Wrap around. Tsunamis tend to align themselves parallel to the shoreline so they wrap around headlands, sand spits and even whole islands, so that it can be just as dangerous on coasts not facing the tsunami source.



Wrap around effect.

Tsunami Warning

The Pacific Tsunami Warning Centre (PTWC) in Hawaii detects and provides warnings of potentially damaging Pacific wide tsunami.

For further information please see the following links:

International Tsunami Information Centre (ITIC):

<http://www.tsunamiwave.info>

Pacific Tsunami Warning Centre (PTWC):

<http://www.prh.noaa.gov/ptwc>

While warnings of far-source / ocean-wide tsunami can be given well in advance of the tsunami arriving, unfortunately, warnings cannot be given about a near-source tsunami because it can reach shore within 10-20 minutes of the earthquake or eruption that caused it. This was the case with the 17 July 1998 event in Aitape, Papua New Guinea.

KEY POINTS TO REMEMBER:

Tsunami can strike any coastline in the Pacific — warnings apply to YOU. For tsunami survival remember the following three warning signs:

1. An earthquake
2. Any unusual change in sea level
3. A ROARING noise

Upon noticing the warning signs:

- RUN to a safe place
- Do not wait to be told
- Do not wait until you see the wave — that is too late because the wave travels faster than you can run.

YOU ARE SAFE FROM THE WAVE AS LONG AS YOU ARE SEVERAL KILOMETERS FROM THE WATER'S EDGE OR ARE ON HIGH GROUND.

What you can do before, during and after a tsunami

PREPARE FOR A TSUNAMI

- Since tsunamis often happen suddenly, everyone in the community must know the warning signs. An earthquake in your area is a natural tsunami warning sign, as is a noticeable rise or fall of coastal water and a roaring sound as the tsunami rushes towards shore.
- Coastal communities and schools should plan for tsunami — prepare a safe area and escape paths (more than one) so that people can reach the safe area quickly. The safe area should be on high ground or at least a few kilometers from the coast.
- Have disaster supplies on hand — torch and battery radio both with extra batteries, emergency food and water, can opener, basic medicines, money and sturdy shoes.
- Develop an emergency communication plan and post-disaster meeting place in case family members are separated during a tsunami.

DURING A TSUNAMI

- Listen to your radio or television for emergency information — if you hear a tsunami warning or if you become aware of any of the warning signs, evacuate and seek higher ground immediately.
- Do not stay in low-lying coastal areas after an earthquake has been felt. If the earthquake occurs just offshore, there will be very little time for response so head for higher ground as quickly as possible.
- Never go to the shore to watch a tsunami. If you can see it you are too close to escape.
- If you are in a boat offshore, do not return to shore — the vessel is safe in the open ocean.
- During a tsunami emergency, police and other emergency organizations will try to save your life. Give them your fullest cooperation.
- A tsunami is not a single wave — it is a series of waves, so stay out of danger areas (coastal and low-lying regions) for at least 2-3 hours.

AFTER A TSUNAMI

- Listen to your radio for advice and updates.
- Help trapped or injured people.
- Stay out of damaged buildings. When returning to your home, enter it with caution — check for gas leaks, electrical shorts and live wires.
- A small tsunami at one point on the shore can be extremely large a few kilometers away. Don't let the modest size of one make you lose respect for them all.