

## 7. Tsunami

**Where did happen the latest tsunami?**

= *wave that extends from the ocean floor to the surface*

Tsunami are caused by:

- *earthquakes*
- *volcanic activity*
- *shocks of massive undersea landslides*

Up to 90% of tsunami occur in the Pacific Ocean. **Why?**

Tsunami has

- a very long wavelength: 150 – 250 km, in open sea 1000 km
- long periods: 10 – 60 minutes (the time between successive waves or tsunami)

**Tsunami characteristics:**

- ❑ The waves are difficult to observe until they approach land.
- ❑ Tsunamis travel fast in open oceans, reaching speeds of up to 500 – 1000 kph.
- ❑ When the tsunami hits the coast, its speed is reduced.
- ❑ As it slows down, the wavelength is shortened and the energy is transferred upwards in the rising wave crest.

July **1998**: villages in **West Sepik Coast of Papua New Guinea** (Figure 1 and 2) struck by a tsunami => 6000 people dead (1/2 of area population). Villagers had little warning of the tsunami = sounded like the roar of a jet plane. Series of tsunamis reaching heights of over 9 m flattened a remote (peripheral) part of Papua New Guinea famed for its beauty and tranquillity.

Many of killed people were children from nearby villages who had gathered in Sissano Lagoon for the school holidays. Most were just swept away by the tsunami. A further 6000 people were made homeless.

Cause: 2 submarine earthquakes, magnitude of 7.0 on the Richter scale => submarine plates moved by 2 m, 24 km off the coast => *too close to warn*.

**What's the consequence? What are secondary hazards/effects associated with tsunami?**

Consequence:

- a) many of dead bodies washed up in the lagoon => the problem changed = the *risk of disease increased* ⇔ contamination of water by dead bodies, rapid decomposition of the corpses
- b) *the threat of pneumonia* ⇔ many of the survivors were hiding in the bush in fear of further tsunami
- c) *large number of wounded* overcrowded area's small hospitals
- d) *absence of medical equipment* => minor wounds became dirty and life-threatening
- e) *amputations* ⇔ gangrenes
- f) some *survivors died later because of their injuries*, living in emergency conditions
- g) survivors had to rely on the *foreign aid* (dry clothes, new food and tools)
- h) lagoon was declared a prohibited area for 2 yrs => ultimately became a sacred place for the memory of those lost in the tsunami

## Counter-tsunami measures

The worst impacts of tsunamis can be reduced by:

- evacuation of citizens ⇔ in most cases warnings can be given
- zoning of land use
- removing (removal) of houses and other buildings to higher ground and restricting new building construction in the main risk areas
- constructing of breakwaters, sea walls and planting of dense groves of trees => to absorb the initial impact of a tsunami and reduce the force that remains.

Why did the counter-tsunami measures have so little effect in Papua New Guinea?

*Figure 1: West Sepik Coast of Papua New Guinea*



*Figure 2: Sissano Lagoon and coast of Aitape*



## Keywords:

impact of tsunami, wavelength, wave crest, pneumonia, contamination of water, decomposition of corpses, gangrene, breakwater, restriction of construction, survivor, threat, wound