

Nicaragua - 2 September 1992



A major earthquake with magnitude estimated at 7.6 occurred off the Pacific coast of Nicaragua on September 2, 1992. This was the strongest event since the Managua earthquake of December 23, 1972, which killed between 5,000 and 12,000 people. The earthquake, generated a very destructive local tsunami which struck along a 220 km coastal section of the Pacific coast of Nicaragua. At least 27 communities were impacted. Waves reached a maximum of 10 meters in height and penetrated by as much as 300 to 400 meters inland. The tsunami had an indirect or indirect impact on about 40,500 people.

It killed about 170 people and left 13,000 homeless. Property losses were extremely high. The tsunami destroyed most of Nicaragua's Pacific fishing fleet.

There was no time to issue a local tsunami warning and Nicaragua, at that time, was not an ITSU member. There had been no studies assessing the tsunami threat for this area. The large tsunami which struck was a complete surprise - even to scientists. It was much larger than what would have been expected for an earthquake of that magnitude, and it did not behave in the traditional way. There were many lessons that were learned from this event - for scientists as well as officials of disaster organizations. Coastal residents claimed that they did not feel strong ground movements, as it would have been expected, to warn them of an imminent tsunami danger - so they did not run to higher ground. Survivors claimed that they did not hear the characteristic rumbling that a local earthquake would be expected to produce. They only felt a minor tremor and assumed there was no tsunami threat. They were totally surprised when waves of up to 10 meters arrived.



The lesson learned was that each earthquake in certain regions can be unique. It was determined that the magnitude of this earthquake had been underestimated because most of the seismic stations measured only seismic waves of short period. Short period waves had not been readily produced by this quake because of its long duration of faulting. Measurements with long period seismometers would have shown the magnitude of this earthquake to be five times greater. The quick dissipation of short period waves accounted for the absence of strong ground movements or rumbling the coastal residents reported. Scientists learned that unusually large tsunamis can be generated by earthquakes with slow fault motion within subducted sediments. In fact, several similar earthquakes have occurred around the world which are now being called "tsunami" earthquakes. It is estimated that 5 to 10 percent of all tsunami generating earthquakes may be "silent" earthquakes of this type.

Indonesia - Flores Island - 12 December 1992

An earthquake of magnitude 7.7, with epicenter about 35 km NW off the north coast of the eastern part of Flores Island - near its largest city Maumere - generated a local tsunami which killed 1690 people and destroyed approximately 18,000 houses.

The first tsunami wave arrived on the shores of Flores Island within two minutes after the initial shock and reached the north shore within five minutes. Huge tsunami waves with runup of up to 26.2 m completely overrun and

destroyed Riang-Kroko, a small village at Cape of Watupajung at the extreme NE end of Flores Island, killing 137 people. Offshore landslides, triggered by the earthquake, may have contributed to the enormous size of the waves which struck this village.



Elsewhere on Flores Island the tsunami runup ranged from 2 to 5.2 m, peaking at Kolisia village, an area which also experienced maximum subsidence from the quake's ground movement. Tsunami waves of up to 2.9 meters completely inundated the small, densely populated village of Wuhring [wuhring island], located on a low spit about 3 km NW of the city of Maumere. The waves destroyed most of the houses and killed 87 of the 1400 people living there. Waves with runup of up to 4.6 m also overrun the low lying village of Nebe on Flores island, destroying nearly all the homes and killing two people. On the island of Babi, located about 40 km NE of Maumere, waves with maximum runup of 5.6 m killed 263 of the island's 1,093 inhabitants.



View of Wuhring, a small village 5km of Maumere a small densely populated community located on the 400m long and 200m wide peninsula. Wave runup averaged 3.0-4.0m, but there was overland flow; i.e., the wave completely swept over the peninsula.

View looking S of the remains of fishing boats swept 100-200m inland, at a fish-factory about 10km west of Maumere. The wave runup here was estimated 4-6m.



