

Chapter 10

Indian Ocean Earthquake and Tsunami

ABSTRACT

On 26th of December 2004, an earthquake having magnitude of 9.1 as per Richter scale occurred in the west of the Indonesian island of Sumatra. This earthquake which occurred in the Indian Ocean is known as the South Asia, Sumatra, Indonesia, or Sumatra-Andaman Earthquake by the scientific society. This earthquake has been the deadliest earthquake in recent times, and the tsunami created by the earthquake traveled between the continents and caused great loss of life and economic losses. Nearly 280,000 people died in 12 different countries due to the earthquake and more due to the tsunami. Besides the loss of life, most people suffered from damage to their livelihood in the farming and fishing sectors. This disaster, being one of the most deadly that was ever recorded, changed the diet of the area, spiked food prices, and limited access to food markets.

INTRODUCTION

On December 26, 2004, at 07:58:53 local time, a fault rupture triggered an earthquake affecting most of the Indian Ocean. The epicenter was located at 3.31°N and 95.95°E, approximately 250 km (155 mi) south-southeast of Banda Aceh, the capital city of the Aceh Province in northern Sumatra, Indonesia (Risk Management Solutions, 2006). It was the third largest earthquake for one hundred years and the largest since the one in Prince

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William Sound in Alaska in 1964, which measured 9.2 on the Richter scale (Athukorala & Resosudarmo, 2005; Gökçekuş, et al., 2018). The tsunami that resulted instigated the most terrible natural disaster in recent history. The most affected countries in the Indian Ocean were Indonesia, Sri Lanka, India, Maldives, and Thailand. 250,000 people were reported dead or missing with more than a million displaced. A total of five million people were affected by this natural event (Bandara & Naranpanawa, 2005).

Tsunamis are formed when an earthquake occurs under the sea and deforms the sea floor. The tsunami waves move away from the source and great speed, with the crest moving at a higher speed than the trough (with a lesser water depth), leading to steepening of the leading wave. Tsunamis are not giant breakers but a very fast-moving high tide with most of the damage occurring from the strong movement of the water and debris floating in the water. The tsunami on December 26, 2004, was triggered by seafloor deformation along a fault extending several hundred kilometers from the epicenter off the west coast of Sumatra to the northern end of the Andaman Islands. It made landfall on the coast of Indonesia, Thailand, and Malaysia. The tsunami waves later moved towards India and Sri Lanka, killing and displacing even more people. It reached 5,000 miles from its epicenter in Asia, even reaching the coastal areas in South Africa (Jackson, et.al., 2005; Reid, 2004). Half an hour after the earthquake, waves that reached the coasts of Indonesia reached the coasts of India and Sri Lanka between 1.5 hours and 2 hours; it reached Thailand, which is closer to the focus of the earthquake, in 2 hours, slowing down due to the relatively shallower depth in the Andaman Sea; It reached the east coast of Africa in time periods ranging from 7 to 12 hours. Apart from these, it was seen that the wave seen for 16 hours in Struisbaai, the southernmost point of Africa, and some energy escaping to the Pacific Ocean on the other side, created a wave of 20-40 centimeters in North and South America, and the wave height was 2.6 m in Manzanillo, Mexico (JMO, 2004).

In 2004, the tsunami warning system in the Indian Ocean was nonexistent, although there was one in the Pacific Ocean. While the Pacific Tsunami Warning Center (PTWC), located in Hawaii, issued the first information bulletin only 15 minutes after the earthquake, and the second notice at 69 minutes after the earthquake, but governments and local communities in the Indian Ocean area did not receive these messages. It did cause some flooding damage to Madras Atomic Power Station at Kalpakkam, near Chennai, on the east coast of India, the first the first tsunami damage to a nuclear power plant in the world. However, the reactors were shut down and no major damage occurred (NOAA, 2005; IAEA, 2011).

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