

2004 Indian Ocean (Sumatra) Tsunami

Description

A magnitude 9.1 undersea earthquake that struck off the west coast of the Indonesian Island of Sumatra on December 26, 2004 was the third largest earthquake in the world since 1900; USGS estimated the earthquake released the energy of 23,000 Hiroshima-type atomic bombs. The resulting tsunami spread across the Indian Ocean and devastated the shores of Indonesia, south Asia, eastern Africa, and Madagascar with waves up to 100 feet high. Because at that time there were no tide gauges, wave sensors or modeling systems in place for the Indian Ocean, or a coordinated tsunami communications system, most areas in the region were hit by the waves without any warning.



Clockwise from top: 1) Banda Aceh after the tsunami. Image: USGS 2) The tsunami carried this barge nearly 2 miles inland. Image: USGS 3) Sri Lanka before and after the tsunami. Image: NASA

Impact

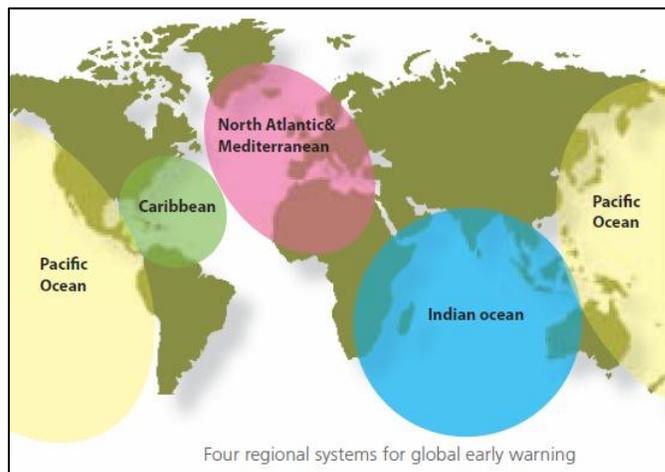
The 2004 Indian Ocean Tsunami was the deadliest tsunami in known history, with over 227,000 people from 11 countries killed or missing, and more than 1.7 million people left homeless. Children comprised nearly a third of those who died; it is thought this was because they did not have the strength or stamina to survive the waves. Many more women than men died, although this is attributed more to the culture and traditions of the affected areas; e.g., when the waves hit, numbers of women were waiting on coastlines for the fishermen to arrive with the day's catch.

There was physical damage to ecosystems, such as mangroves, coral reefs, forests, coastal wetlands, vegetation, sand dunes and rock formations, as well as impacts to animal and plant biodiversity and groundwater. The spread of solid and liquid waste and industrial chemicals also caused environmental damage, and many farms, homestead plots, and aquifers were salinized by the seawater, with some small islands permanently submerged or rendered inhabitable. Many residents who subsisted on the income from farming, aquaculture, fishing or tourist industries lost their livelihoods.

Lessons Learned

Public education and awareness of the potential hazard could have saved many lives, even without an official communications system. In a number of documented cases, both residents and tourists stood spellbound on the beaches watching the sea recede, unaware that it was a sign of an approaching tsunami. In places like Langi village on the island of Simeulue, where the residents had passed on a long oral tradition of tsunami and evacuation education, lives were not lost in spite of the fact that they were one of the closest communities to the epicenter of the earthquake, and had only minutes to get to high ground.

At a United Nations conference in 2005, agreement was reached to create three tsunami warning and mitigation systems in the Indian Ocean, the Caribbean Sea, and the Mediterranean Sea and



North Eastern Atlantic; when fully operational these systems, combined with the existing Pacific Ocean system, will provide global coverage for coastal populations. The Indian Ocean Tsunami Warning and Mitigation System became active in June 2006; it consists of seismic-monitoring instruments, sea-level gauges and threat-risk modeling programs, as well as public education. Tsunami regional service centers throughout the region are now responsible for disseminating warning notices once they are received.

References and Additional Resources

NOAA Center for Tsunami Research: *NOAA 26 December 2004 Indonesian Earthquake and Tsunami Web-Link Compilation*

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http://en.wikipedia.org/wiki/2004_Indian_Ocean_earthquake

International Oceanographic Commission: *Where the First Wave Arrives in Minutes*
http://itic.ioc-unesco.org/index.php?option=com_content&view=article&id=1678&Itemid=1075&lang=en

UNESCO: *Five Years After the Tsunami in the Indian Ocean – from Strategy to Implementation. Advancements in global early warning systems for tsunamis and other ocean hazards*
<http://unesdoc.unesco.org/images/0018/001858/185825e.pdf>

Emergency Medicine International: *Impact of 2004 Tsunami in the Islands of Indian Ocean: Lessons Learned*
<http://www.hindawi.com/journals/emi/2011/920813/>

Asian Disaster Preparedness Council: *Social and Economic Impact of December 2004 Tsunami*
http://cmsdata.iucn.org/downloads/social_and_economic_impact_of_december_2004_tsunami_apdc.pdf