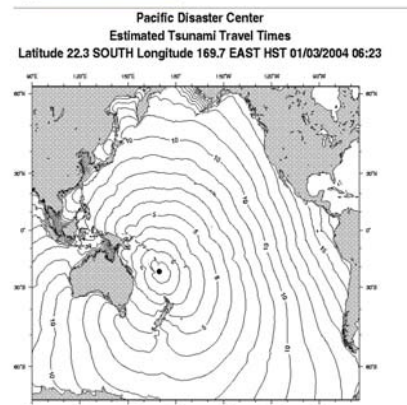


## Ongoing Tsunami Programs

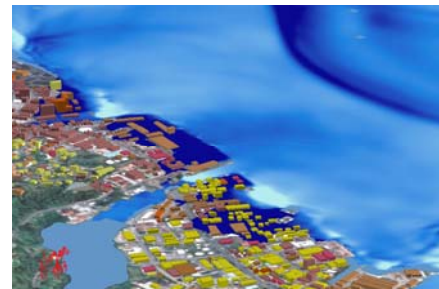
### Automated Tsunami Alert System

PDC's Automated Tsunami Alert System provides emergency officials with critical travel-time notification for tsunamis that may be generated when a major earthquake occurs. In Hawaii, this system improves emergency managers' awareness by automatically delivering official Pacific Tsunami Warning Center bulletins via pager and cell phone, posting bulletins to PDC's operationally-oriented web site, and generating modeled tsunami travel time maps. This system is being developed into a multi-hazard message trafficking system for all emergency alerts or notifications.



### Tsunami Inundation Modeling and Visualization

Over the past several years, PDC has collaborated with tsunami modelers to calculate inundation areas for historic tsunamis in Fiji, Vanuatu, and Hawaii. Visualization products, including animated graphics, help officials to better understand their vulnerability and assist them in preparing for the possible impact of a major tsunami. In addition, PDC has partnered with Hawaii-based organizations to revise and publish Tsunami Risk Evacuation Maps for the state's priority tsunami risk areas.



### Tsunami Education and Training, Awareness, and Exercise Support

Between July 2004 and April 2005, PDC facilitated three tsunami and hurricane exercises—as part of a PDC Integrated Risk Management Training Program—in partnership with the East-West Center for stakeholders in the Pacific Islands, including disaster, water, and power utility managers. In collaboration with the South Pacific Applied Geosciences Commission (SOPAC) and the United Nations Educational, Scientific and Cultural Organization's (UNESCO) International Tsunami Information Center, these training collaborations have led to the development of another educational tool for Asia Pacific emergency managers—a "Tsunami Awareness Kit" specifically tailored to the unique geographic and cultural diversity of the region. PDC has also supported tsunami exercises in the State of Hawaii by the 196th Infantry Division's Defense Coordinating Element as well as Hawaii State Civil Defense.

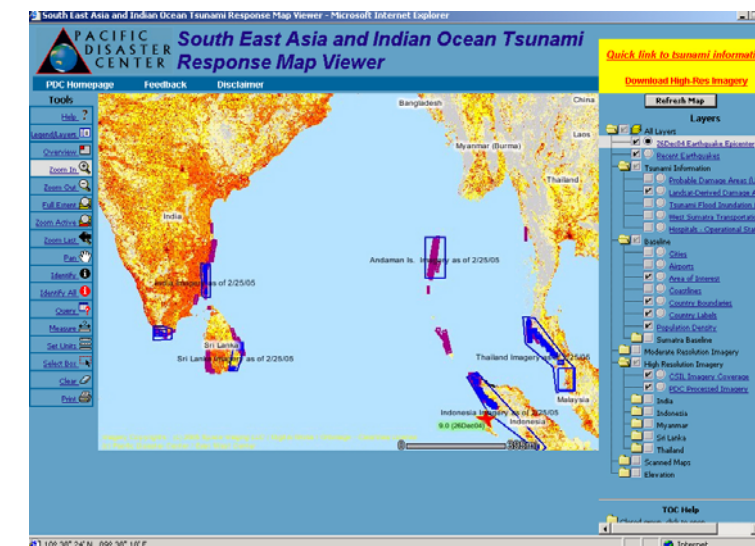


## Indian Ocean Tsunami Response

### Information Support for the Regional Catastrophe

The Sumatra-Andaman Islands Earthquake and Indian Ocean Tsunami of December 26, 2004 ranks as one of the deadliest natural disasters in modern history. Claiming over 200,000 lives and causing extensive damage, the event created an instantaneous humanitarian crisis for millions across the Indian Ocean Basin.

Pacific Disaster Center (PDC) immediately undertook activities to provide support to emergency managers and the general public. These efforts have been further supported by PDC's ongoing tsunami-related programs, which have been applied in Hawai'i and the greater Asia Pacific region over the past six years.



*PDC's South East Asia and Indian Ocean Tsunami Response Map Viewer was designated as a "consolidated information access point" by the U.S. Government to access imagery and related geospatial products. (Source: PDC)*

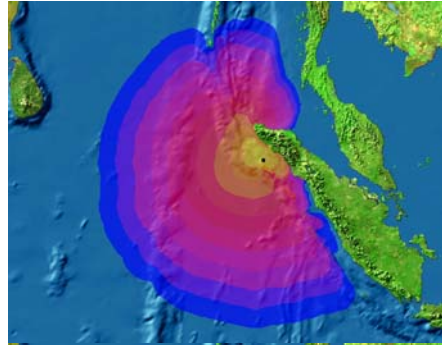
*"PDC's imagery will have a profound impact on a return to normalcy for the people in this district..."*



*Fieldwork in Banda Aceh, Indonesia. PDC's Mike Napier provided geospatial support to U.S. Pacific Command's field operations and the World Health Organization in Banda Aceh, Indonesia. (Photo: PDC)*

*- Mercy Corps International on the impact of PDC's tsunami response efforts in areas of Sri Lanka*

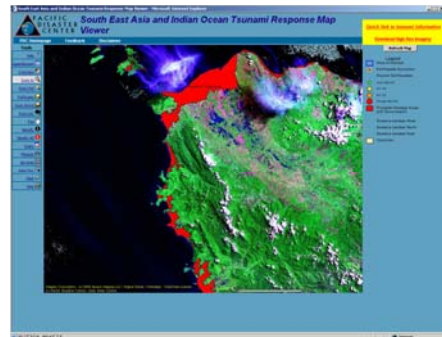
## PDC Regional Tsunami Response Support Activities



**PDC graphical representation** of modeled tsunami travel time near Sumatra. Colored bands indicate ten minute arrival intervals as the tsunami began to spread throughout the Indian Ocean Basin. The black dot represents the December 26, 2004 earthquake epicenter. (Source: ITDB/PAC\*; PDC)

**“We increasingly believe that we are not alone here...”**

- Local Indonesian NGO in Banda Aceh, Indonesia, who used the Map Viewer to support its relief efforts



**The Map Viewer and associated ArcIMS Map Service** provide high-resolution satellite imagery and damage assessment maps to responders, national governments, and humanitarian assistance organizations around the world. (Source: PDC)

### Situational Awareness for Humanitarian Response

On December 28, 2004, through PDC’s public web site and the Media Services office of the East-West Center, PDC began supplying news sources and information products about the disaster as it unfolded. A “portal” on PDC’s web site included links to daily situation assessment briefings compiled by two sister disaster management-related organizations in Hawaii—the Center of Excellence in Disaster Management and Humanitarian Assistance, and the Virtual Information Center. These reports were pushed to emergency operations personnel throughout Asia. The portal also included a wealth of geospatial information products for humanitarian assistance organizations, such as nearly 100 damage maps of the region and “Before-and-After” high resolution imagery.

<http://www.pdc.org/tsunami.info>

### Tsunami Response Geospatial Information Service and Internet Map Viewer

On December 30, 2004, PDC deployed the Indian Ocean Tsunami Response Geospatial Information Service, a GIS service offered through its Asia Pacific Natural Hazards Information Network. This disaster-specific application provides geospatial information support to humanitarian operations in the field.

The twice-daily updated service provides responders with an interactive source of frequently-updated tsunami information—providing a “big” regional picture, and allowing online viewers to “drill down” to examine impacted areas in further detail. The Map Service contains baseline (pre-event) and post-event related information including damage maps and hundreds of high-resolution satellite images. Mercy Corps International, the University of Washington, and the GIS Unit of the United Nations also collaborated with PDC in a partnership to assist with imagery processing efforts. <http://apnhin.pdc.org>

To further support disaster response and humanitarian assistance efforts, PDC also deployed an interactive map of the impacted area. The Southeast Asia and Indian Ocean Tsunami Response Map Viewer uses data from the geospatial response service—including high resolution imagery—and displays the information within an Internet browser. The Map Viewer was identified as a “consolidated information access point” by the U.S. Government for missions abroad, as well as international and nongovernmental organizations to access imagery and related geospatial products. <http://www.pdc.org/tsunami>

### Field Deployments

On January 1, 2005 six members of the PDC team deployed to provide assistance in the field in the disaster’s aftermath. These missions included geospatial support for the Government of Thailand’s Department of Prevention and Mitigation, United States Pacific Command’s field operations, and the World Health Organization’s field office in Banda Aceh, Indonesia.

### Indian Ocean Aftershock Alert System

On January 7, 2005, PDC deployed IOQuake, an e-mail based notification system for significant earthquakes in the Indian Ocean region. The service provides emergency managers with warnings of potentially tsunami-generating earthquake aftershocks. IOQuake has disseminated alerts for many events, including a massive 8.7 magnitude earthquake which occurred on March 28, 2005 off the coast of Sumatra. The aftershock claimed nearly 2,000 lives but did not generate a major tsunami.

<http://elists.pdc.org/mailman/listinfo/ioquake>

### ThoughtWeb Relief

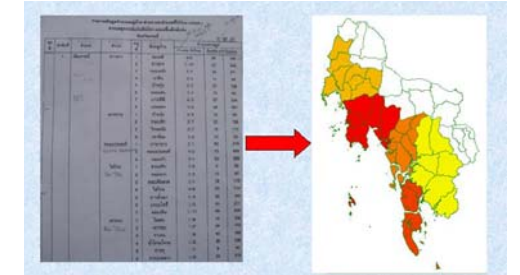
On February 11, 2005, in partnership with Australian-based company ThoughtWeb Inc., PDC launched ThoughtWeb Relief, a collaborative web site to assist disaster relief experts to collect, interpret, and prioritize information used in decision-making. ThoughtWeb Relief is designed to help organizations to coordinate and integrate information on relief and recovery operations. <http://www.thoughtwebrelief.com>

### Expert Consulting for Thailand and Sri Lanka

Between March and May 2005, PDC provided requested expert consultation on disaster management and tsunami-related technical and planning topics in Bangkok for Thailand’s Sub-Committee on National Disaster Warning Center Administration, which is commissioned by the Thai Prime Minister. PDC also briefed four members of the Sri Lankan Parliament’s Select Committee on Disaster Management during a study tour at the East-West Center in Hawaii.

### Modeling for Tsunami Research

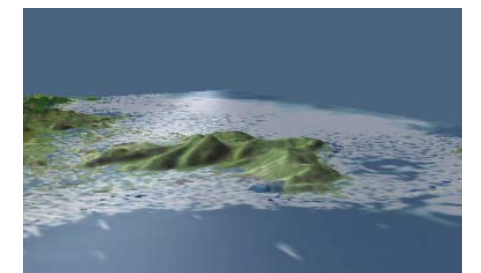
As an ongoing collaboration with National Oceanic and Atmospheric Administration (NOAA)’s Pacific Marine Environmental Laboratory, PDC is working on a project to model tsunami inundation in Banda Aceh. Preliminary research was presented at a United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) minister’s meeting held in March 2005. This project will support research and understanding of the tsunami’s physical dynamics and its resulting impacts.



**Example of GIS analysis** that was derived from early tabular tsunami impact information for Thailand immediately following the Indian Ocean tsunami. PDC deployed a geospatial analyst to Thailand’s Operations Center at their request. (Source: Thailand Department of Disaster Prevention and Mitigation; PDC)

**“We badly need maps”**

- First message received by PDC from an emergency manager in the impacted region following the tsunami



**Three-Dimensional Representation** of the Banda Aceh peninsula before (top) and during (bottom) the tsunami event. (Source: PDC)