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# USGS National Center for Earth Resources Observation and Science (EROS) Response to the Asian Tsunami Disaster

The U.S. Geological Survey's National Center for Earth Resources Observation and Science (EROS) is playing a vital role in relief efforts to nations impacted by the Asian tsunami disaster of December 26, 2004. EROS maintains the world's largest collection of civilian remotely sensed data of the Earth's land surface. Within hours after the disaster occurred, EROS began providing relief organizations worldwide with pre- and post-tsunami satellite images, as well as image-derived products that incorporate information on population density, elevation, and other relevant topics. These images and image-derived products are being used by relief organizations to make practical, well-informed decisions as to where relief efforts are most urgently needed and how best to carry out those efforts .

Responding to the urgent requests of several governments and numerous organizations and agencies, EROS is contributing to the relief efforts by supplying images and developing information products of the tsunami-affected coastlines, and making them available via *The National Map* Hazards Data Distribution System (http://gisdata.usgs.net/website/Disaster_Response). Eight weeks after the disaster, over 517 ,000 files were downloaded (ftp://edcftp.cr.usgs.gov/pub/data/disaster), totaling nearly 4.4 terabytes of satellite data covering over 750,000 square miles of coastal and inland areas, from the ftp site. We have also distributed approximately 1 terabyte on media. The following highlights a number of the groups using these data and their role in the disaster relief effects:

**Managing disaster relief efforts and implementing U.S. relief funds:**

- U.S. Agency for International Development/ Office of Foreign Disaster Assistance,
- The Department of State,
- United Nations Office for the Coordination of Humanitarian Affairs,
- United Nations World Food Program;

**Directly implementing relief efforts on the ground:**

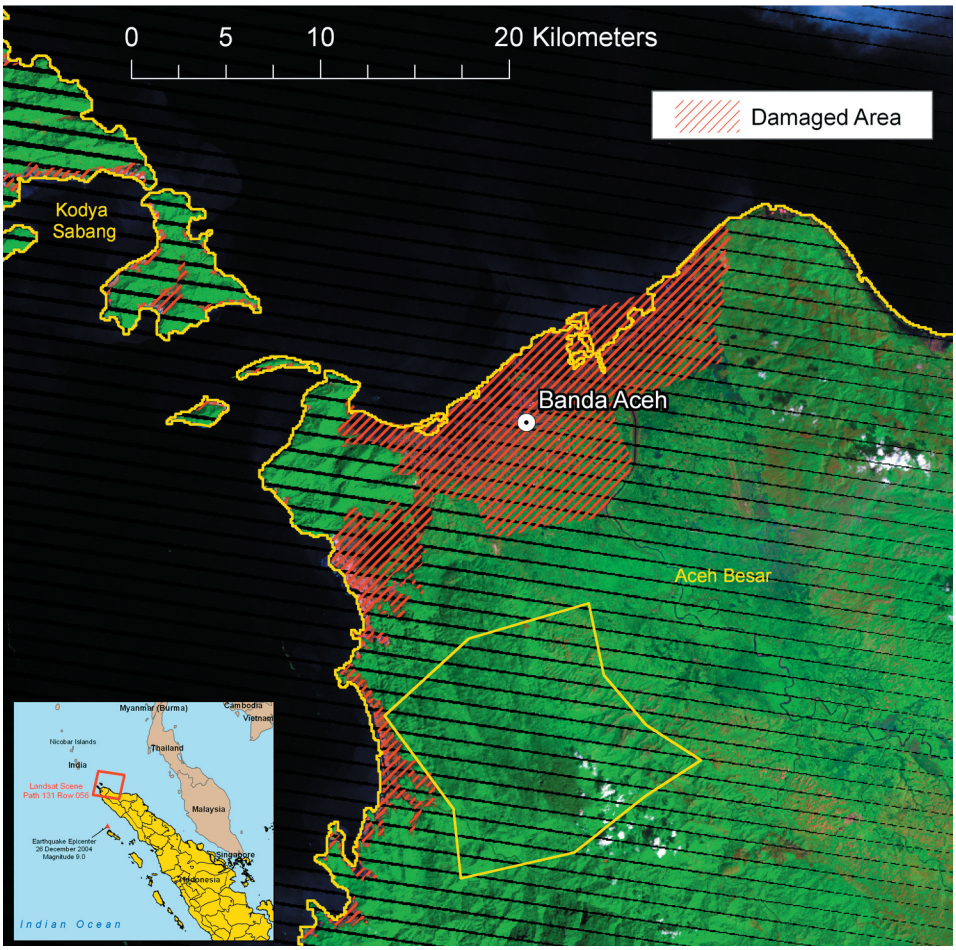
- Governments of tsunami-impacted nations,
- United Nations World Food Program,
- A large number of non-governmental organizations (NGOs), including Doctors without Borders, Catholic Relief Services, CARE International, and others;

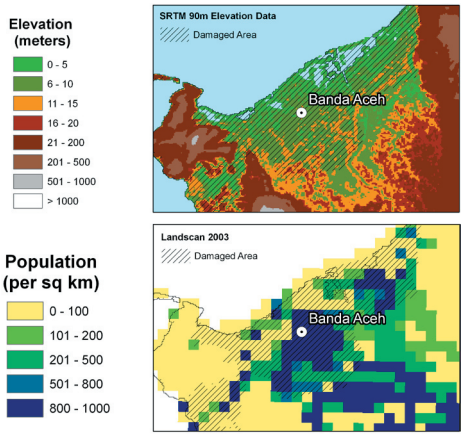
**Providing scientific and technical support:**

- National Oceanic and Atmospheric Administration,
- National Aeronautics and Space Administration,
- U.S. Geological Survey,
- Army Space Command,
- Corps of Engineers,
- U.S. Department of Agriculture,
- National Geospatial Intelligence Agency,
- International Charter: Space and Major Disasters,
- Pacific Disaster Center,
- International Water Management Institute,
- European Organization for Particle Physics/UNOSAT,
- EURIMAGE,
- SERTIT (France),
- German Aerospace Center,
- Centre National D'études Spatiales,
- The European Space Agency.

The images and image products EROS is providing to these groups come primarily from the Landsat 5 and 7, ASTER, EO-1, and commercial satellites such as SPOT, IKONOS, Digital Globe, and Quickbird. Landsat images are particularly useful in that they provide a large-area view of impacted areas, giving a clear idea of the magnitude of the disaster. Yet the images also contain the detail needed to provide accurate information about conditions on the ground—information vital for relief workers to make sound decisions about how to prioritize relief efforts, determine who needs help most urgently, and decide where, when, and how to distribute food, water, and other aid.

The set of images below illustrates the utility and versatility of these EROS satellite images and image products.




| Administrative Unit | Affected area population |
|---|---|
| Kodya Sabang | 917 |
| Aceh Besar | 296,387 |
| Aceh Barat | 68,039 |
| | |
| Total | 365,343 |

Population figures within the affected area are based on Landscan 2003 population data.

## December 29, 2004

Post-tsunami Landsat 7 satellite imagery is being used to delineate areas affected by the tsunami and relate the "damaged area polygons" to elevation and to population based on administrative unit.

The dynamics of the Asian tsunami disaster are constantly changing and will require long-term assistance on the part of the international community. An event of this magnitude underscores the invaluable nature of the EROS archive and Earth-observing satellites such as Landsat 7. Archived Landsat images, paired with those being gathered at this moment, reveal, with incomparable detail, the tremendous change wrought by such a disaster. By combining these images with other kinds of human and environmental data, EROS scientists are creating essential tools for bringing assistance to the millions in Asia who need it.