

# LATIN AMERICA AND THE CARIBBEAN

TSUNAMI PREPAREDNESS AND MITIGATION ACTIVITIES

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## OVERVIEW

The Caribbean is a seismically active region traversed by deep ocean trenches, underwater volcanoes, plate boundaries, and fault lines, all of which have the potential to generate catastrophic coastal hazards in a region where millions of inhabitants live near the seashore. The Caribbean and its adjacent waters, including the Atlantic Ocean, has been the source region for 11 percent of the world's fatal tsunamis, with almost one hundred observed tsunamis that have impacted 23 countries, according to the Intergovernmental Oceanographic Commission (IOC) of the U.N. Educational, Scientific, and Cultural Organization (IOC-UNESCO), which supports governments in assessing tsunami risk and implementing tsunami early warning systems and community preparedness measures. While earlier attempts languished, efforts to establish a tsunami early warning system in the Caribbean resumed with renewed intensity following the Indian Ocean tsunami, which caused widespread death and destruction in December 2004. Since early 2005, USAID's Office of U.S. Foreign Disaster Assistance (USAID/OFDA) has supported development of the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Region (CARIBE EWS) in coordination with IOC-UNESCO. As part of this project, USAID/OFDA provides funding and technical assistance to improve scientific monitoring capabilities and increase tsunami awareness at the community level. USAID/OFDA disaster specialists are part of the U.S. delegation to the IOC-UNESCO Intergovernmental Coordination Group for CARIBE EWS, which first met in early 2006 in Barbados. USAID/OFDA chaired the Working Group on Preparedness, Readiness, and Resilience from its inception until January 2010.

## COORDINATION MEETINGS AND WORKSHOPS:

In February 2005, USAID/OFDA facilitated a coordination meeting among Caribbean technical agencies to begin developing the warning system. The meeting was hosted by the Caribbean Emergency Disaster Response Agency, since renamed the Caribbean Emergency Disaster Management Agency (CDEMA). This was followed in April 2006 by a USAID/OFDA-supported workshop hosted by the University of the West Indies Seismic Research Unit, now called the Seismic Research Centre (UWI/SRC), which is the agency responsible for monitoring earthquakes and volcanic activity for the English-speaking Eastern Caribbean countries, as well as the Dutch islands of Saba, St. Eustatius, and St. Maarten. The workshop brought together regional specialists who manage seismic monitoring networks to initiate information sharing and discuss equipment needs to make the warning system operational. In June 2007, more than 40 meteorologists, seismologists, and disaster managers from more than 20 countries and territories in the region attended the "Caribbean Regional Training Program in Seismology and Tsunami Warnings," funded by USAID/OFDA and implemented by the U.S. Geological Survey (USGS). These discussions led to the development of two complementary USAID/OFDA-supported projects, one focusing on improving scientific monitoring capabilities to detect seismic events or increased wave heights and the other focused on increasing tsunami awareness and preparedness at the community level.

## STRENGTHENING SEISMIC AND TSUNAMI MONITORING CAPABILITIES:

In August 2006, USAID/OFDA provided \$249,680 to UWI/SRC to implement the 18-month "Caribbean Tsunami Early Warning System Communications and Protocols Project." The project upgraded the Eastern Caribbean seismograph network—a collection of seismographs that are linked into a central monitoring unit—and enhanced its capacity to detect, monitor, and provide early warning for tsunamis and related geological hazards. USAID/OFDA funding helped purchase equipment and software to enable more rapid transmission of information regarding seismic events to vulnerable communities in the Eastern Caribbean.

## **INCREASING COMMUNITY AWARENESS:**

In September 2007, USAID/OFDA provided \$475,200 to CDEMA to implement a two-year project entitled “Empowering Coastal Communities to Prepare for and Respond to Tsunamis and Other Coastal Hazards.” The public awareness and education program provided the knowledge and skills to respond effectively to tsunamis and coastal hazards to approximately 2.5 million residents living on or near coastal areas in the Caribbean. The project featured two fundamental components: first, creating an effective model for protocols and procedures for receiving and disseminating warnings to all stakeholder agencies and potentially affected communities; and second, developing public education and awareness materials for CDEMA-participating states. These materials addressed not only tsunami-related threats, but other coastal hazards as well. USAID/OFDA’s Caribbean-based disaster risk management specialists assisted in the development of the protocols and procedures. USAID/OFDA assistance was a critical link between the investments that the U.S. Government has made in regional seismological monitoring and Caribbean countries’ national systems to effectively warn coastal inhabitants when tsunamis or other threats are detected.

## **CAPACITY-BUILDING SUPPORT:**

From 2007 to the present, USAID/OFDA has supported a number of tsunami training activities for regional disaster professionals and scientists throughout the Latin America and Caribbean region:

- Between 2007 and 2011, USAID/OFDA supported various seismologists and other regional scientists, as well as disaster managers from Antigua and Barbuda, Chile, Ecuador, El Salvador, Nicaragua, and Saint Lucia, to attend a two-week international tsunami training program at NOAA’s International Tsunami Information Center (ITIC).
- In 2012, USAID/OFDA provided \$35,000 to support the ITIC Training Program, including course materials and the participation of four scientists and disaster managers from the region.
- In 2013, USAID/OFDA provided \$60,000 to ITIC to conduct two regional workshops entitled “Strengthening Tsunami Warning and Emergency Response Standard Operating Procedures.” Workshops were held for Central American scientists in El Salvador in February 2013, and in Chile, for South American scientists, in March 2013. ITIC designed the workshops to strengthen procedures for national tsunami warning and emergency response in Eastern Pacific and Caribbean countries and provide instruction on the new Pacific Tsunami Warning Center (PTWC) international tsunami forecast products. The trainings were a collaborative effort of ITIC and IOC-UNESCO, with funding from USAID/OFDA and USGS. Participants included representatives from the national tsunami warning centers and national disaster management offices of Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Peru.
- In 2014, USAID/OFDA provided \$65,000 to support two additional ITIC trainings, scheduled for Mexico and Ecuador in April and June, respectively. Following the trainings, PTWC Regional Working Groups for the Central American Pacific Coast and Southeast Pacific will meet to discuss the further needs and actions required for effective implementation of the new PTWC products, among other topics.

## **SUPPORT FOR POST-TSUNAMI SURVEY IN EL SALVADOR:**

On August 26, 2012, a magnitude 7.2 offshore earthquake caused a tsunami in El Salvador that measured up to six meters at impact and affected approximately 30 kilometers of Pacific coastline. While neither event caused fatalities or significant damage, flooding from the tsunami reached up to 300 meters inland. In early September 2012, USAID/OFDA participated in a post-tsunami survey in El Salvador, organized by ITIC and conducted in conjunction with Government of El Salvador authorities, to identify gaps in early warning systems and help improve future responses.

## **CARIBBEAN TSUNAMI INFORMATION CENTER:**

USAID/OFDA supported development of the Caribbean Tsunami Information Center, which was officially launched in Barbados in December 2013. The center works with member states to implement a comprehensive tsunami preparedness and mitigation program in the region, including tsunami education and awareness activities, as well as the development of national standard operating procedures.