

ITSU-XX**NATIONAL REPORT FORMAT** submitted by **NICARAGUA****BASIC INFORMATION****1. ICG/ITSU National Contact:**

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4. Local Tsunami Procedures

Organization that identifies and characterizes tsunamigenic events in the immediate source area:

Instituto Nicaragüense de Estudios Territoriales (INETER) by means of its national seismic network and its round-the-clock early warning system.

Threshold for declaring a potential local tsunami emergency:

Magnitude $M \geq 7.0$; Location in the Pacific Ocean of Central America

Organization that acts on the information provided by the agency responsible for characterizing the potential local tsunami threat:

The National System for the Prevention, Mitigation and Attention of Disasters (SINAPRED) and the Civil Defense of Nicaragua, emitting warning messages to the local authorities on the Pacific coast, using an emergency radio communication system.

Additionally, INETER itself sends warning messages via INTERNET directly to radio and TV stations, using special messenger software. INETER transmits also information and warning messages via cell phone (SMS) to a limited number of persons, who have responsibilities in the warning system.

INETER contacts seismic networks and Emergency Commissions in the Central American countries to inform them on the tsunami threat.

How is the emergency situation terminated:

By recommendation of INETER, transmitted to the population by SINAPRED and Civil Defense and directly via local radio and TV stations.

5. Distant Tsunami Procedures

What organization becomes aware of tsunamigenic events from a distant source:

Instituto Nicaragüense de Estudios Territoriales (INETER), by means of receipt of messages from PTWC via email and/or WMO/GTS.

Additionally, own data from the national seismic network plus digital registrations of a virtual regional network are processed, results from NEIC (National Earthquake Information Center) are checked to define large earthquakes in the Pacific Basin; if possible, institutions near the epicenter of the tsunamigenic event are contacted or Web pages are checked whether a tsunami has occurred. Also, INETER maintains communications to the local organization of radio amateurs who supply valuable information especially in case of strong regional earthquakes.

What actions does this organization take with regard to tsunamigenic events from a distant source?

An alert message with recommendations on the actions to be taken is sent to Civil Defense of Nicaragua and to the national secretariat of SINAPRED. Secretariat of SINAPRED decides on the actions to be taken in the special situation and the message

to be distributed to all institutions members of this organization, the mass media and the general public.

Additionally, INETER contacts seismic networks and Emergency Commissions in Central America to inform on the tsunami threat.

What are the criteria for initiating tsunami mitigation procedures?

Criteria for taking mitigation measures are:

- PTWC issues a warning for Central America, and/or
- INETER estimates that a tsunami threat could exist, based on its own seismic data, or other local, regional or remote sources

What actions are taken in response to warnings issued by PTWC during intersessional period?

Monitoring is intensified, independent information is checked; own seismic recordings are checked; other institutions are requested or their Web sites are monitored whether a tsunami has occurred; media are monitored.

A proposal for a decision about the emission of a tsunami warning is prepared by INETER and transmitted immediately to SINAPRED and Civil Defense

6. National Sea Level Network

At the present time Nicaragua has **one** sea gauges operating on the coast of the Pacific Ocean, maintained by INETER. The station was donated in 2004 by NOAA and is installed in Corinto; data transmission via GOES satellite. **XYZ** gauges were installed several years ago by the RONMAC project but are not working, actually. The parameters of these stations are not adequate for tsunami warning as the sampling frequency is 1 sample per hour.

7. Information on Tsunami occurrences

No local tsunami occurrences.

SUMMARY

The Nicaraguan Seismic Network was expanded considerably. A major upgrade of the Nicaraguan seismic network was the installation of 12 broad band stations in Western Nicaragua. A small seismic array was installed at INETER's premises in Managua. The array is used to accelerate data processing of strong seismic events. Ten new sea gauges are to be installed. A preliminary tsunami hazard map was elaborated for all Central America. A tsunami hazard assessment was carried out for the 4 most populated areas at the Nicaraguan Pacific coast. A rapid alert messenger software was developed to transmit warnings via INTERNET to radio and TV stations. Warning simulations were carried out by Civil Defense Organization. The development of a Regional Tsunami Warning System for Central America has been further promoted.

NARRATIVE

Seismic network and data center

The Nicaraguan Seismic Network was expanded considerably in 2004-2005 considering the needs of the tsunami warning system. A small seismic array (9 sites with 4.5 Hz geophones, 16-bit A/D, direct access to INETER LAN) was installed in the Seismic Data Center of INETER in Managua, to support the National and Regional Tsunami Warning System with rapid automatic locations. 12 seismic broad band stations were installed in Western Nicaragua. These stations are mainly designed for volcano monitoring but data is made available for general seismic surveillance and tsunami warning.

Data from a virtual network of seismic stations in Central America, Mexico, Puerto Rico, Colombia, Venezuela, and Ecuador are received in near real time via LISS or Seed-Link servers and are used for the rapid evaluation of strong regional earthquakes.

Communication system - Transmission of warning messages

Civil Defense Organization of Nicaragua has improved its radio communication system with the more than 20 settlements at the Pacific coast of Nicaragua. Local authorities were trained in the use of the system. A test carried out in March 2005 showed that all the radio sites connected receive the warning message within 7 minutes. Nevertheless, the system has serious drawbacks as the local person who receives the message has only traditional measures (shouting, bells, car **xyz**) to pass the warning to the neighborhood. The real percentage of the population who actually will receive the warning by this system is not known. A more sophisticated system with hand driven or electric sirens could not yet be acquired due to funding problems.

INETER has developed a messenger-like software system for immediate transmission of warning messages via INTERNET to radio and TV stations and other destinations. The messages are displayed directly on the computer monitor in the transmission cabin to be read instantly by the presenter and transmitted by him to the population.

Education and information to the population

In March 2005, Nicaraguan Civil Defense Organization carried out an information campaign to inform the local population at the Pacific coast about tsunami hazards and right behavior in case of tsunami warning.

Tsunami Hazard Assessment

A preliminary map on tsunami hazard at the Pacific and Atlantic coast of Central America has been elaborated. A tsunami assessment was carried out for the four most populated areas at the Nicaraguan Pacific coast near the towns Corinto, Puerto Sandino, Masachapa and San Juan del Sur.

Regional Cooperation

Nicaragua has intensely promoted the establishment of a Regional Tsunami Warning System in Central America. Proposals about procedures for this system and projects necessary to develop its different components were elaborated by INETER and sent to

CEPREDENAC (Center for Disaster Prevention in Central America, Intergovernmental organization). A Regional Workshop on the establishment of the system was organized by INETER and CEPREDENAC in Managua on 27-29 of April, 2005.

Future plans

INETER acquired ten new gauges which are to be installed in the near future. It is planned to place 5 gauges on the Pacific coast, 3 on the Atlantic coast and two in the large Nicaraguan lakes; Data transmission shall be via INTERNET as soon adequate connections can be made available at the foreseen sites.

INETER has foreseen to develop a system for the transmission of warning messages via cellular telephone systems to large groups of persons.

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