

**ITSU-XX****NATIONAL REPORT OF THE REPUBLIC OF ECUADOR****1. CONTACT INFORMATION (name, address, phone, fax, e-mail)**

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**2. AUTHORITY AND COORDINATION**

The 1964 Law of National Security gave the National Office of Civil Defense (DNDC, acronym in Spanish) the mandate of developing and coordinating the actions destined to prevent disasters. DNDC's work has in practice been circumscribed to the closest phases of disaster, i.e., emergency alert and response. In order to know the fundamental objectives of Civil Defense, the following articles and their numbers can be cited, in which their field of action is detailed:

**Art. 80.** The fundamental goals of the System of Citizens' Security and Civil Defense are the following:

a) Prevent disasters in order to reduce or avoid damages;

- b) Plan assistance and organize the population to overcome the circumstances of the disaster or calamity;
- c) Procure emergency rehabilitation of the affected population in order to ensure the vital conditions;
- d) Raise awareness in the population on their responsibilities in matters of Civil Defense and their active participation in it;
- e) Strengthen public safety to counteract actions and events that attempt against citizens' security in all its dimensions and circumstances;
- f) To facilitate planning, coordination and execution of operations and programs that allow prevention, control, combat, sanction and social reinsertion of offenders and delinquents with the participation of the forces of the Joint Task, Aiding Force and Paramilitary Forces, and in all public and private State entities, with which all Ecuadorians and foreigners residing in national territory are obliged to cooperate; and,
- g) Mobilize human resources and materials existing in the country to assist the crisis or disasters in conformity with the law and the corresponding regulations ".

There is no specific law that allows Civil Defense to take action and provide an appropriate emergency response after a tsunami.

Through Supreme Decree No. 642, issued on July 18th, 1972, the State entrusts the INSTITUTO OCEANOGRAFICO DE LA ARMADA (INOCAR) (Oceanographic Institute of the Navy) to carry out tasks of Maritime Security and its dissemination; including within this framework, topics of physical oceanographic, chemical, geological, geophysical and meteorological character. The Oceanographic Institute of the Navy (INOCAR, acronym in Spanish) is an organism that is attached to the Naval Force, which carries out its role of research in the Ecuadorian sea, in issues related to the contamination of the marine environment, evaluation of estuary ecosystems or the *mitigation of disasters caused by natural phenomenon, such as tsunamis*; assessment of mineral resources that are required in the national maritime area and in the Antarctic.

### 3. TSUNAMI WARNING AND TSUNAMI MONITORING

Currently, our country receives alerts from the Pacific Tsunami Watch Center (PTWC) through electronic mail, having a FAX as an alternate mean. During work

hours the messages are received by the personnel in charge of this at the Tsunami Section, while after work hours, the people in charge of receiving the messages from PTWC are the guarding personnel of the institution, this is uninterruptedly, 24 hours a day, seven days a week.

The country still does not have a National Tsunami Alert System, however, we have insisted in our intention of creating one in coordination with national and international scientific and research institutions. At the moment, INOCAR, through its Department of Ocean Sciences, and the University of San Francisco de Quito (USFQ), through its Vulconology, Geology and Geodynamic Center is working on a draft Project for the implementation of a Local Tsunami Watch System. This System has been conceived in the framework of a technical – scientific methodology based on the early detection and location of close seismic effects capable of generating tsunami events. To reach this objective, INOCAR and USFQ, have posed the need to implement a modern and automated coastal seismic network, whose technical administration will be under the charge of a multi-participative and multidisciplinary group integrated by national institutions related to this topic.

With regards to sea level monitoring, INOCAR operates a tidegauge network made up by 11 stations, of which three are connected to the International Pacific Watch System. The stations possess mostly STEVENS brand tidegauges, model GS-98, except for two (Esmeraldas and Baltra), which are the AXSYS model of the aforementioned brand. Sea level information is recorded every five minutes.

Currently, the data of 9 of the stations is obtained and processed on a monthly basis, however, the two other stations of the network are automated, transmitting data daily through the General Packet Radio System (GPRS, by cell phone). The automation of five more stations (Esmeraldas, La Libertad, Posorja, Puná and Puerto Bolívar) is planned for the month of September.

Unfortunately, due to reasons of coverage (cell phone) in the areas located, three stations will still not be able to be automated (Limonas, San Lorenzo and Baltra), for which it will be necessary to wait for the adequate moment. The remaining station (Puerto Nuevo) requires the acquisition of the transmission equipment, which will further delay its automation.

The current net of tidal stations that are administrated by the Oceanographic Institute of the Navy (INOCAR) is constituted by the following stations:

PORT	LATITUDE	LONGITUDE	TEAM
Limonas	1° 15.0'N	78° 59.0'W	GS-98 (STEVENS)
San Lorenzo	1° 18.0'N	78° 50.0'W	GS-98 (STEVENS)
**Esmeraldas	0° 59.0'N	79° 39.0'W	AXSYS – SDI (STEVENS)
** Bahía de Caráquez	0° 36.0'S	80° 25.0'W	GS-98 (STEVENS)
**Manta	0° 56.0'S	80° 43.0'W	GS-98 (STEVENS)
* La Libertad			GS-98 (STEVENS)
Data de Posorja	2° 42.0' S	80° 15.0'W	GS-98 (STEVENS)
Pto. Nuevo Guayaquil	2° 16.0'S	79° 55.0'W	GS-98 (STEVENS)
Puná	2° 44.0'S	79° 55.0'W	GS-98 (STEVENS)
Pto. Bolívar	3° 16.0'	80° 00.0'W	GS-98 (STEVENS)
* Isla Baltra	0° 27.0 S	90° 17.0'W	HANMAR - STEVENS/NOAA
* Isla Santa Cruz	0° 45.0'S	90° 17.0'W	HANMAR – STEVENS/NOAA

\*Platforms equipped with tide sensors of the NOAA

\*\*Automated stations. Real-time Transmission.

#### 4. TSUNAMI WARNING RESPONSE AND EMERGENCY PREPAREDNESS

In spite of not having a formal National System, we have been seeking to establish an efficient mechanism to disseminate the alert information pertaining to tsunami events. In such a sense, once the alert messages are received from PTWC, INOCAR is in charge of communicating that information to Port Captaincies and the Civil Defense, whom, at the same time, will notify the general public. Activities of evacuation and mobilization of coastal communities are responsibility of both authorities, while the emission of alarms and alerts, as well as their cancellation are competency of INOCAR. This is based on the Basic Plan established by the Coordinating Group of the Pacific Watch System, while for the local part, INOCAR takes the historical data of each locality and the studies that have been carried out in the area.

Among the strengths of the current dissemination system, the logistical capacity that the Naval Force has through its Port Captaincies can be mentioned, as well as, in the field of communication, its own network that allows a fast and effective dissemination. However, a weakness that has to be mentioned is that the means used

for the dissemination (telephone and fax) are subject to external connections, over which institutions exercise no control whatsoever, thus resulting in less efficiency, despite the fact of having a logistically robust network.

Since January 2004, INOCAR has been participating in the conformation of a National Emergency Operative Committee (COEN, in Spanish), as part of the Scientific and Monitoring Committee Group. The institutional commitment has been evidenced through its active participation to validate the necessary processes within COEN in what regards to tsunami monitoring, for which work protocols have been established.

## **5. TSUNAMI HAZARD AND RISK**

The risk of tsunamis in Ecuador is imminent. Various studies have shown the risk that Ecuadorian coasts have of this threat. Of the studies on risk assessment of tsunamis on the Ecuadorian coasts, started in 1989, it has been determined that the northern and central Ecuadorian coasts are the zones with highest tsunami risk, while the southern coasts present a medium risk of these events. These studies have allowed the development of maps of flood risk by tsunamis for a large part of the Ecuadorian coastal cities with the highest levels of population. These maps were developed using the Yamaguchi Method and have been prepared on paper format. Since 2003, an updating of the information of these maps has been achieved using a number modeling system. In early 2004, with the support of the International Tsunami Information Center (ITIC), the first digital flood map was produced for the city of Esmeraldas, obtained through the number modeling of historical events occurred on the northern coast of Ecuador. It is important to highlight that historically, this has been one of the zones with most seismic activity. In the present, flood maps for two very important localities on the Ecuadorian coast, La Libertad and Salinas, are being updated. A sample of the flood map developed for the city of Esmeraldas will be presented to the bureau during the XX ITSU Meeting.

As was previously mentioned, INOCAR, together with USFQ and other entities directly or indirectly involved with the issue of tsunamis is working on the draft Project for the implementation of a Local Tsunami Alert System. An essential step in this draft project is constituted by the classification of the Ecuadorian coastal zone based on the risk of tsunami events, and using the study on the internal and external

Geodynamic continental and island area. Such classification, and the subsequent generation of risk maps represents a primary tool for the determination of the technical characteristics of the coastal seismic network to be implemented.

## **6. TSUNAMI PUBLIC AWARENESS AND PREPAREDNESS, AND COMMUNITY LEVEL ACTIVITIES**

In early 2004 a series of national level activities were undertaken with the purpose of creating the National Emergency Operative Committee (COEN), in which INOCAR would be part of the scientific group for the management of information on emergencies produced by tsunamis. However, after a year and a half, COEN has not yet been activated.

As a responsible institution before the international community for the alert and prevention in the presence of tsunamis, and as part of the institutional strategic plans, in mid 2004, INOCAR presented two projects to the Joint Staff of the Armed Forces, which goal was the prevention and preparedness of Ecuadorian coastal communities. These projects are: “Flood Maps caused by Tsunamis on the Ecuadorian Coast” and “Educational Awareness Project of Ecuadorian Coastal Areas”. Both projects have been developed throughout 2004 and 2005, in a progressive, but successful way. According to the diagnostic made in the Educational Awareness Project, we were able to establish that as a country, the situation, in terms of the population’s response capacity before a tsunami event of great magnitude (with regards to the public awareness and the degree of preparedness) was not optimum.

With this background, INOCAR has identified the need to increase and expand the education and awareness of coastal populations, seeking to reach a larger and more diverse human group. This goal has derived in the formulation of a new educational project that intends to combine traditional education techniques and methodologies with new, but effective innovations, such as the creation of Interpretation Centers in the principal populations of the Ecuadorian coastal zone.