CONFERENCE ON - BEST PRACTICES ON TSUNAMI AND COASTAL HAZARDS COMMUNITY PREPAREDNESS AND READINESS IN CENTRAL AMERICA AND THE CARIBBEAN

Preparedness work done in Saint Lucia, and looking at how this can be expanded to include the Tsunami hazard.

Panama City, 11-13 August 2008

Presented by:
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Director – National Emergency Management Organisation
Who has the mandate for Disaster Management in Saint Lucia?
Who has the **LEGAL** mandate for Disaster Management in Saint Lucia?
What instruments give NEMO that mandate and authority?

- *The Disaster Preparedness and Response Act 13/2000*  
  [will be replaced by the Disaster Management Act 30/2006]
Other instruments

Water & Sewage Act No. 14 of 2005

Education Act No. 41 of 1999


Police Ordinance No. 30 of 1965

Factories Act No. 8 of 1943
## LEVELS OF RESPONSE TO DISASTERS

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Extent of Regional Involvement</th>
<th>Examples</th>
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<tbody>
<tr>
<td>I</td>
<td>Local incidents within a Participating State are dealt with in the regular operating mode of the emergency services. The local national focal point is required to submit, on a timely basis, information on the emergency event for the purposes of consolidating regional disaster records.</td>
<td>Local Response - no regional response required</td>
<td>Conway Fire [June 2004]</td>
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<tr>
<td>II</td>
<td>Disasters taking place at the national level which does not overwhelm the socio-economic structure or capacity to respond within the affected state. In such cases, the primary assistance at the regional level will be limited to providing technical expertise to National Disaster Organizations or facilitating their access to specific resources which may be required due to the particular disaster event. The whole operation is still managed by the national disaster focal point.</td>
<td>Local Response with limited or specialized assistance</td>
<td>• Tropical Storm Debby (September 1994)  • Gros Piton Fire [2002]</td>
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# LEVELS OF RESPONSE TO DISASTERS

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<td>III</td>
<td>Disasters which overwhelm the capacity of the affected state(s) to respond. In such instances the Regional Response Mechanism is activated. This includes the activation of the Caribbean Disaster Relief Unit (CDRU) which is the operational arm of the Regional Response Mechanism. The CDRU comprises representatives from the military forces within CARICOM and its main responsibility is logistical support for the receipt and dispatch of relief supplies.</td>
<td>Full activation of the Regional Response Mechanism</td>
<td>Hurricane Ivan [September 2004]</td>
</tr>
</tbody>
</table>

Source: CDERA/CU
NEMO Services

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http://www.slumet.gov.lc/
Information!
Executive Summary

STANDING OPERATING PROCEDURES [SOPs]

- SOPs: General [Approved 1149/96]
- SOPs: EOC [Approved 1149/96]
- SOPs: Declaring a Disaster [Laws of Saint Lucia]
- SOPs: National Shut Down

Telecommunications Procedures [Approved 1149/96]

Mass Crowd Events Guidelines
Saint Lucia National Emergency Management Plan...

POLICIES & GUIDELINES
A Policy Framework on Disaster Management
Donations and Importation of Relief Supplies Policy
Emergency Shelter Management Policy
Emergency Housing Policy
Hazard Mitigation Policy
Mass Fatalities Policy
Mass Crowd Events Policies and Guidelines
Governmental Officers Security Travel Policy
Backup Policy
National Policy on Ambulance Operations
National Incident Management System [NIMS] Policy
Saint Lucia National Emergency Management Plan...

COMMITTEE PLANS

Damage Assessment and Needs Analysis Guidelines
Damage Assessment and Needs Analysis Plan
Crisis Communication Guide
Information Management in Disasters and Emergencies
Telecommunications Plan / Relief Distribution Plan
Shelter Management Program
National Plan for Transportation in Disasters
Welfare Emergency Management Support Plan
Stress Response Team Plan
Emergency Action Plan for Agricultural Pests And Diseases
Hospitality Industry Crisis Management Plan
Model Plan for the District Disaster Committees
Saint Lucia National Emergency Management Plan...

HAZARD SPECIFIC PLANS

- Hurricane Plan [Approved 1149/96]
- Oil Spill Contingency Plan
- Hazardous Materials Plan
- Hazard Mitigation Plan
- Maritime Search and Rescue Plan
- Land Search and Rescue Plan
- Response Plan for Externally Displaced Persons
- Drought Response Plan / Flood Response Plan
- Fire Response Plan
- Earthquake Plan / Volcanic Eruption Plan / Landslide Plan
- Strategy on the Management of Used Oil
Saint Lucia National Emergency Management Plan...

**GOSL PLANS**
- The Ministry of Works Plan
- The Ministry of Health Plan
- Private Sector Response Plan
- Borderlais Prison Emergency Plan
- Airports and Seaports Contingency Plans
- Guidelines for Debris Management in a Disaster
- Ministries of External Affairs - Guidelines in case of Disasters
- National Incident Management System [NIMS] Plan
- GOSL Continuity of Operations Plan [COOP]
Saint Lucia National Emergency Management Plan...

AGREEMENTS

Articles Establishing the Caribbean Disaster Emergency Response Agency [CDERA]

St George’s Declaration of Principals

Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations

United Nations Millennium Goals

Agreement Between Member States and Associate Members of the Association of Caribbean States for Regional Cooperation on Natural Disasters
NEMO Organizational Chart

Chair
Prime Minister

Deputy Chair
Cabinet Secretary

Director NEMO

Secretariat

NEMAC
Permanent Secretaries [Tourism, Planning, Agriculture, Social Transformation, External Affairs, Public Service, Finance], National Chairs, Director General Saint Lucia Red Cross, Chief Engineer, Director Information Services, GM - SLASPA, Chief Medical Officer, Chief Fire Officer, Chief of Ports Police, Chief of Police, Head - SSU

Director NEMO [ex officio]

National Committees
1 – Damage Assessment and Needs Analysis [DANA], 2 – Transport, 3 - Supplies Management, 4 - Telecom, 5 - Welfare, 6 - Health, 7 – Emergency Shelters, 8 -Oil Spill, 9 – Works, 10 – Information, 11 – Hospitality Crisis Mgn’t Unit, 12 – National Hazard Mitigation Council, 13 - Stress Team, [Soon: 14 - Agriculture Committee]

District Committees
1 - Gros Islet, 2 - Castries North, 3 – Castries North West, 4 - Castries South, 5 - Castries South East, 6 - Castries East, 7 - Castries Central, 8 - Anse la Ray, 9 - Canaries, 10 - Soufriere, 11 - Choiseul, 12 - Laborie, 13 - Vieux Fort North, 14 - Vieux Fort South, 15 - Micoud North, 16 - Micoud South, 17 - Dennery North, 18 - Dennery South

Ex Officio Members
Ministry Liaison Officers [reps of the Permanent Secretaries]

Diplomatic Corps
Committee Responsibilities

[National and District]

Pre Disaster Activities

1. Design, review, revise annually district disaster mgmt plan.

2. Maintain an inventory of resources

3. Knowledge of emergency shelters;

4. Develop, maintain & update Hazard Maps

5. Systematically implement mitigation measures.
Committee Responsibilities

[National and District]

Post Disaster Activities

1. Maintain contact with NEOC.

2. Org., manage & co-ord emer. relief activities, post disaster surveys, reports, etc.

3. Activate mutual aid agreements as necessary.

4. Inform & collaborate with colleague emergency Committees.
Committees Responsibilities

[National and District]

Post Disaster Activities

5. Arrange for control of entry of non-essential visitors to disaster areas.

6. Ensure Public Info is consistent with that of NEOC.

7. Maintain warning system & ensure information dissemination.
Disasters

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.

SOME EXAMPLES...
WHAT ARE THE RISKS?

Government of Saint Lucia
Saint Lucia National Risk Register
Dated August 2, 2006

Modeled upon the Sassen Local Resilience Forum: Community Risk Register of 14th November 2005

(The information displayed in the document is valid only at the date of publication as risks are monitored on an ongoing basis.)
Hurricanes & Storms: Hurricane Lenny [1999]

Soufriere Waterfront

Photo Credit: Saint Lucia Red Cross

Photo by Saint Lucia Red Cross
Tropical Storm Lilli [2002]

Dennery Waterfront

Photo Credit: NEMO Sec
Tropical Storm Debbie [1994]

Fond D’Or Beach, Dennery

Erosion of coastal lands, Rodney Bay

Photo Credit: Gillian Cambers
Storm Surge

Hur. IVAN [Sept. 2004]

Saint Lucia
Hur. IVAN [Sept. 2004]

Grenada
Hur. IVAN [Sept. 2004]

Grenada
Fires Ward Building Fire – 2004

Photo Credit: UNKNOWN
Fires [Conway 2004]

Photo Credit: HTS
Seismicity map showing locations of major earthquakes which have occurred in the Eastern Caribbean in the **20th century**.
Earthquake

Large earthquakes in Saint Lucia have occurred on:

11 Jan, 1839 = 7.5 magnitude
2 Feb, 1906 = 7.0 magnitude [67 yrs later]
19 Mar, 1953 = 7.3 magnitude [47 yrs later]
29 Nov, 2007 = 7.3 magnitude [54 yrs later]

Average = 54 yrs
Next = 2061????

Earthquake
Earthquake 7.3 (Martinique – Nov. 29, 2007)

If you're indoors during an earthquake, drop, cover and hold on.

Credit: BBC.com
Credit: SRU
Credit: Red Cross
Volcanoes
(Saint Lucia)

Integrated Volcanic Hazard Zones for Saint Lucia

Taken from Saint Lucia Volcanic Response Plan
What is a tsunami?

Tsunamis are a potential hazard, rather than a real major hazard, in the Eastern Caribbean. In the recorded history of the region, nobody has ever been killed by a tsunami in any of the islands from the Araguato Passage to Trinidad and damage has been minor. Tsunamis are the one geological hazard that are actually increasing with time. This is because the submarine volcano, Kick ‘em Jenny, in the southern Grenadines is gradually evolving into a condition where it is more and more likely to generate a significant tsunami (amplitude more than ten meters at ten kilometers form source) within the next 50 years to be greater than 50%.

Why is it called a tsunami?

The word tsunami is taken from two Japanese words which mean harbor wave.
Tsunami

If you can see the wave it is too late

When at the beach (or the coast)...

If the sea leaves - then so should you!!

Head for the hills and safety immediately! For a tsunami (giant sea wave) is coming!!
Tsunami

The tsunami threat to Saint Lucia is from a sub-marine volcano called Kick ‘em Jenny
Here the assumption is that the earthquake epi centre is at that coastal location with the understanding that tsunami travel time charts are reversible. This means that the travel times are exactly the same, no matter in which direction the tsunami wave travels on a given chart, i.e. from an epi centre in the ocean to a coastal site or vice-versa.

Tsunami travel times in hourly contours are shown on a tsunami travel time chart.

SOURCE: Tsunami Travel Time Atlas for the Atlantic Ocean – York University - 2006
Tsunamis on the move...

Tsunamis...
- Are a series of long-wavelength, long-period ocean waves. They are not surfing waves.
- Come ashore for hours. The first wave may not be the largest.
- Are caused primarily by earthquakes occurring below or near the seafloor.
- Are less frequently caused by underwater volcanic eruptions, landslides, slumps, and meteorites.

Tsunamis...
- Travel at jet airliner speeds in the deep ocean, but the waves are only centimeters high and cannot be felt aboard ships.
- Slow down and grow in height tremendously upon entering shallow water.
- Can crest to 10-m high heights, strike with devastating force, and quickly flood all low-lying coastal areas.
- Threaten life and property.

Knowledge is Safety: Tsunami Warning Signs...
- An earthquake is one of nature’s tsunami warning signs. If you’re at the beach and the ground shakes so hard you can’t stand up, a tsunami may have been generated.
- Tsunami may be preceded by a rapid fall in sea level as the ocean retreats exposing fish and rocks on the sea bottom.
- A roar like an oncoming train may be heard as a tsunami rushes toward the shore.

What you should do...
- After an earthquake, move quickly inland and to higher ground.
- Tsunami from a local earthquake can strike in minutes, and before a tsunami warning is announced.
- Tsunami from distant locations can take up to 24 hours to cross an ocean basin. Tsunami warnings will be announced advising coastal evacuation to safe shelters.
- Learn to recognize nature’s warnings. Heed official tsunami warnings.
- Stay away from rivers and streams. If you see a tsunami, you may not be able to outrun it. Look for a sturdy, multi-storied, reinforced concrete building and climb to its highest floor or the roof. If there is no time, climb up and cling to a strong tree.
- If you’re swept up by a tsunami, look for something to help you stay afloat, and to protect you from dangerous floating debris like houses, cars, and trees.

For more information, visit www.tsunamiswave.info - International Tsunami Information Centre
Tuesday, November 1, 2005 – The St. Lucia Disaster Diary for 2005 ends with a Tsunami. The 250th Anniversary, set on the scale of the Asian Tsunami of 11 months ago this 8.9 earthquake produced fires and tsunami that killed thousands. With no warning the tsunami arrived on the coastline of the Caribbean islands and wrecked havoc.

In the morning of November 1, 1755, a large earthquake struck Lisbon... It was Sunday and the religious holiday of All Saints. Most of Lisbon's population of 250,000 were praying in six magnificent cathedrals... The main shock of the great earthquake struck Portugal at 9:40 in the morning of November 1, 1755. At that time, there were no instruments to record or measure earthquakes but experts have estimated that the magnitude of the Great Lisbon Earthquake must have been 8.0 or even greater.

It took less than an hour for the first tsunami to reach Morocco and Algeria, and about 7 hours to reach the Caribbean and the U.S. East coast. Remarkable tsunami waves and effects were recorded and reported everywhere, on both sides of the Atlantic. Waves up to 60 feet in height hit a vast area stretching from Finland to North Africa and across the Atlantic to Martinique and Barbados causing much destruction and loss of life.

Antilles, Antigua, Martinique, and Barbados:
The tsunami crossed the Atlantic Ocean, reaching the Antilles in the afternoon. Reports from Antigua, Martinique, and Barbados note that the sea first rose more than a meter, followed by large waves.

...it is estimated that the offshore deep water tsunami amplitudes along the USA coast and the Caribbean coast have been about 2 meters high with periods of 1.25 to 1.5 hours. The maximum tsunami runup on the shore would have been about 10 feet (about 3 meters).

In their Preliminary List of Caribbean Tsunamis/Caribbean Tsunamis: An Initial History James F. Landers and Lowell S. Whiteside indicate that

Waves of amplitude 7 m were observed at Saba, 3.6 m at Antigua and Dominica, 4.5 m at St. Martin, leaving a deep anchored in 4.6 m of water was left laying broadside on the dry bottom, 1.5-1.8 m at Barbados, where the wave had a period of 5 minutes and the water was black as ink. At Martinique, at some places the water was reported to have withdrawn for 1.6 km and at other places it flowed into the upper level rooms of the houses. The lowlands on most of the other French Islands were inundated. [http://www.sedac.ucar.edu/aard/aardtable1a.html]

NEMO takes this opportunity to remind the public that St. Lucia is vulnerable to many hazards and though storms are recurrent we need to be prepared for all manner of hazards.

Note to the press:

Extracts taken from: [http://www.cigionline.com/Tsunami1755Lisbon.html]
• **TSUNAMI FATALITY LEVEL IN THE CARIBBEAN IS SIMILAR TO HAWAII, ALASKA, WEST COAST OF USA COMBINED**

• 88 Tsunami events reported in the Caribbean in the last 500 years

• 14 Tsunami events reported from Puerto Rico and Virgin Islands

• 30 Tsunami events caused significant damage

• Reports of 9,600 fatalities

• 20 Tsunami events in the last 100 years

• 1,922 deaths are confirmed during last 150 years

**SOURCE:** RAFI AHMAD - Unit for Disaster Studies, Department of Geography and Geology
How fast does a Tsunami travel?

The tsunami velocity in the ocean depends on the water depth. For the deepest parts of the Indian Ocean at

- 5,000m, the tsunami propagation speed is slightly more than 8km/h
- 1,000m the propagation speed is 360 km/h, and
- 100m depth it reduces to 110 km/h

Source: Tsunami Risk Mitigation Strategy for Thailand
Recommendation 15:

In its role as interim warning centre, the Pacific Tsunami Warning Centre in consultation with the regional and national centres, will prepare a draft Communications Plan for the Caribbean by March 15th 2006.

[First Session of the OPC Intergovernmental Coordination Group for the Tsunami and Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions – January 5th, 2006]
Next Steps – Cell Broadcasting

- Cell Broadcasting is not affected by, nor does it cause, network congestion or overload.
- Cell Broadcast alert system is geographically targeted, thus messages can be appropriately sent out to people relative to the hazard(s) of threat to them in a specific location.
Seismic Research Unit comments on proposed tsunami early warning system

Next Steps: EWS

Seismic Research Unit comments on proposed tsunami early warning system

By: RJM Seismic Research Unit
Fri, 7 Jan 2005, 14:48

St. Augustine, Trinidad and Tobago, W.I. — January 7th, 2005 — The devastation caused by the tsunami which managed several Asian countries on 26th December, 2004 has sparked discussion on the robustness of a tsunami early warning system in the Caribbean. While in theory such a system may seem valuable in light of the recent Asian disaster, scientists of the Seismic Research Unit currently believes that several factors should be seriously considered before assuming that a tsunami early warning system would be beneficial to the region. Dr. Richard Robinson, head of the Seismic Research Unit, says that “before a region can spend valuable resources on installing new instruments for a tsunami early warning system, it would be necessary to strengthen existing networks and focus on improving public education and communication activities with regard to geologic hazards in the region.”

Tsunamis in the Caribbean are a hazard but a minor one when compared with other natural hazards that affect the region or to tsunami in the Pacific. Potentially devastating tsunamis are rare events with a recurrence rate of the order of once or twice per century. Therefore has been no event in the recorded history of the Caribbean which has caused deaths and destruction comparable to what has occurred in Asia. However, the potential for future events is always present, and the risks to life and property cannot be underestimated.

Tsunami early warning systems can be divided into two components: 1) field observations of earthquake and seismic waves and 2) rapid analysis of the data and interpretation to warn the population. The first part is the responsibility of the local networks, and the second part is the responsibility of the global networks. The Seismic Research Unit believes that the field component of the system is more essential than the analysis component as it is more difficult to establish an efficient warning system and the global networks need the data from local networks to interpret and analyze. Therefore, the local networks must be strengthened before investing in new systems.

In terms of the Caribbean and most regions of the world, the first component of this system is more or less in place. This is because the past few decades have seen the development of seismographic networks and communication systems that have improved such that it is now possible to detect and locate earthquakes down to a magnitude of 5.5 within a few minutes anywhere in the world. This is particularly true for the Eastern Caribbean, which has the most seismographic network of any region in the world. It is possible, during regular working hours and with the existing network, to recognize potential tsunamiogenic earthquakes (magnitude 5 and above) within a few minutes. The process could also be automated such that if such earthquakes occur an alarm is sent to the duty scientists outside working hours. This will increase the response time to at least 30 minutes.

Owing to the risks of the Caribbean and the experience and scientists who have been involved in operating them, setting up an organization and specifically dedicated to tsunami warning in the Caribbean is not envisaged. Because of the large average period between events it is highly likely that any such organization would fade away long before the first event occurred. If the Seismic Research Unit were to issue a tsunami warning every time there was a shallow earthquake of magnitude greater than 6.5 we would have issued two warnings in our 52-year existence (last of Dominica 1969 and Antigua 1974). Both of these would have been false alarms since both earthquakes generated tsunamis with amplitudes less than 1 cm. It is, therefore, likely that a system such as the one described should consider that despite the fact that the historical data tell us that an earthquake is very high and the average period between events is only about 15 years, it is not possible to give such alarms.

More serious than the potential for false alarms is the issue of tsunami travel times. If a tsunami is generated by a submarine event such as an earthquake located between Trinidad and Puerto Rico it will reach the nearest islands within minutes and the whole region within less than an hour. In order to have any real benefit from an early warning system we would have to respond within about 15 minutes and contact relevant disaster management officials within another 15 minutes. This is not possible and it would require that the Seismic Research Unit and all the disaster offices in the region be manned or readily accessible 24 hours a day. Even then assuming a warning to be correct, communities in the nearest islands would have to be immediately evacuated.
Next Steps: To Make it Work
The (NEMO) Borg

We are the Borg
You will be assimilated
Resistance is futile

Credit: Star Trek, The Borg and the Borg Cube are the property of MBR Productions and Paramount Studios.