



Seychelles Progress Report towards a Tsunami Warning System in the Indian Ocean

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1.0 Background

Since the 26th December 2004 tsunami, the Seychelles National Meteorological Services has been designated as the Tsunami Warning Center for the Seychelles. The tsunami warning program is also embedded in the Multi-Hazard Warning System. Various activities, programs and initiatives have been developed to ensure that Seychelles is tsunami ready; and is part of the Global program for a tsunami Warning System in the Indian Ocean. Some of the main work being carried out on tsunami Warning System is outlined below.

2.0 Data Observation and Monitoring

2.1 Seismic Observation

The only seismic instrument located at La Misere, Mahe continues to relate seismic data directly to University of San Diego. The data can be assessed at USGS. No seismic data is available locally..

2.2 Tide/sea level monitoring

New tide and tsunami sensitive gauge will be installed in August 2006. A new building has been erected to house the new instrument.



Fig 1: Building to house new tide gauge as part of the Indian Ocean Tsunami Warning System

3. Communication System

NMS is currently receiving tsunami advisories from JMA and PTWC through the WMO Global Telecommunication System (GTS). The GTS is to be upgraded by WMO later this year. Both real and tsunami test information from the two Global Centers have been successful in the past 15 months.

4. Operational Tsunami Warning Center (24/7)

Duty officers are on standby and available to report to work during advisories and warnings. There are also tsunami focal point backups.

5. Tsunami Warning within the Multi-Hazard Color Warning System

Earthquake and Tsunami guidelines have been implemented operationally as part of the new Multi-Hazard Color Warning System which was introduced in October 2005 during the ISDR launching in Seychelles. It is reviewed and updated on a regular basis.

Earth Quake Magnitude	Depth	Tsunami Risk	Predicted Height Locally	Information Issued
6.5 to 7.0 M	Tsunami risk increases at shallower depths in between 10 to 20 km	Very small possibility of destructive local tsunami	Up to 50 cm	Advisory particularly To Target Groups (Fishermen and maritime users etc)
7.0 to 7.5 M		Possibility of destructive local tsunami effects limited within 100km of the epicenter	50 cm to 1 m	Warning Level 1 (coastal evacuation likely)
7.5 to 8.0 M		Risk of a destructive tsunami effects limited	Over 1 m level	Warning Level 2 (evacuation)
Greater 7.8 M		Chance of having an ocean-wide destructive tsunami	Over 2 m level	Warning Level 2 (evacuation)
Additional Information Required.: Location, type of earthquake, upstream hydrographic data and information				

Table 1: Guidelines of Tsunami advisories and warnings, SNMS, 2005

6. Dissemination

Standard Local Tsunami Warning Templates have been prepared and uploaded on the 'SYNERGIE' data and information system. Emergency address telephone, mobile, fax reviewed, updated and published. Mobile service for alerts has also been implemented. Tsunami advisories/warnings are normally dispatched to disaster secretariat, environmental and media authorities.



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**Seychelles National Meteorological Services
(Early Warning Center)**

THIS IS A TEST SAMPLE

TSUNAMI INFORMATION:

Bulletin / Advisory:	SN:1
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Color Coding Alert Level:

Yello

Date:

05/12/2005

Issued

20:00 LT

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS	
ORIGIN TIME	19:42LT
COORDINATES	(8.7 North), (92.1 East)
LOCATION	Nicobar Islands, Indonesia
MAGNITUDE	7.0 M
DEPTH	20 KM
EVALUATION	Possibility of a local destructive tsunami within the local region. There are no indications that it will affect the Seychelles islands, however we are monitoring the upstream situation very closely.
THREAT AREAS	Nicorbar region
OTHER INFORMATION / RECOMMENDED RESPONSE/ACTIONS	This is the first and final advisory unless there are new developments. Members of the public are advised to continue follow the development. No actions are required at this time
VALIDITY	24:00 LT(Mid Night)
Duty Officer	

Table 2: Sample of a Tsunami Template on SYNERGIE computer System

7. Disaster Secretarial/ Disaster Committee Framework

Under the disaster management framework, five working groups have been established.

1. Education, Awareness and Sensitization
2. Early Warning (NMS, Chair- institution)
3. Hazard mapping (SNOG, Chair-institution, NMS (Member))
4. Communication (Telecom Division, Chair-institution)
5. Legislative (NDC secretariat)

NMS as the tsunami warning center has also chairmanship of the Education, Awareness and Sensitization working group.

8. Education, Awareness and Sensitization program

8.1 Previous Education, Awareness and Sensitization activities

- Home Emergency Kit (self preparedness)
- Education on Multi-Hazard Graded Early Warning System
- Visual documents of recent disasters (TV programs)
- Posters /Brochures on identified National Hazards including tsunami
- Workshop/ Seminars
- Media and related TV educational programs

8.2 Current and Future Educational Programs

- Disaster countermeasures
- Disaster Text Books
- Disaster Reduction management
- Hazard mapping
- Disaster drills
- Sign boards of previous disaster
- Evacuation route
- Disaster museums

9. Tsunami Risk and Vulnerability Assessment (Numerical Modeling)

Basic work has already started on tsunami risk and vulnerability assessment. Few reports are now available, including the details of the survey for the tsunami run-up carried out by the Canadian Geological Survey for the UNESCO. The National Disaster Secretariat has also started a historical risk and vulnerability assessment within the community. Currently NMS, as the Tsunami Warning Center is preparing detailed scientific work on tsunami risk and vulnerability assessment. This will include tsunami generation, propagation for both near and far field tsunamis. This capacity was acquired following the recent tsunami numerical modeling training in Oostend, Belgium, 6-16th June 2006.

Below (fig2) shows tsunami generation and propagation for a case study earthquake in the mid-Indian Ocean similar to the 1983 earthquake close to Diego Garcia using the AVI-NAMI software, IOC-UNESCO June 2006.

Numerical Modeling Capacities in tsunami run –up and flooding maps are yet to be developed under the IOC-UNESCO training program later during 2006

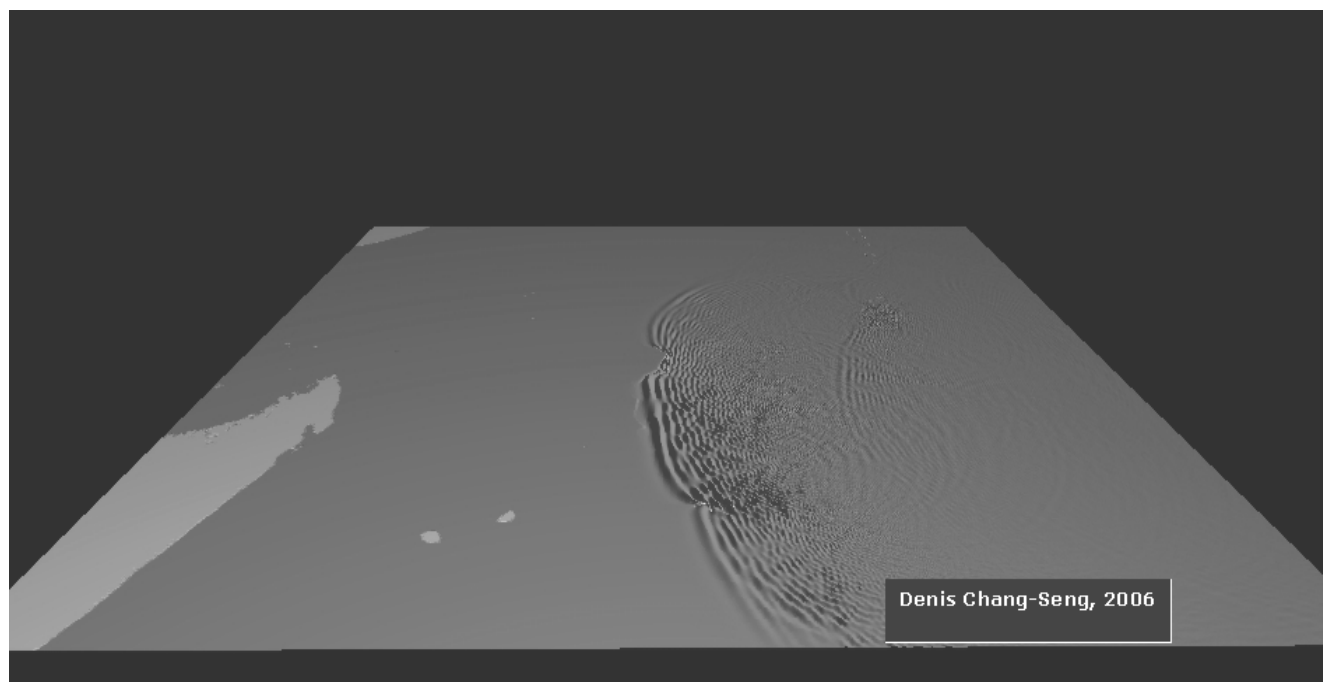


Fig 2; Tsunami generation and propagation from the mid-Indian ocean ($\sim 7^{\circ}$ S, 71° E)

10. Disaster Command and Response Center

A disaster command and response center has been temporarily established at the Seychelles Fire Service at Port Victoria, Mahe Seychelles. It is also a 24/7 service. Currently, the facilities need to be strengthened. There are plans to set up a permanent facility at the same site.

The architectural drawings for the new command center are almost completed and a first draft of the plan will be submitted to the President for review and approval shortly. If approved this center will be one of the best within the region in terms of mainstreaming of communication for disaster response. The center will be equipped with state of the art technology for communication and observation

11. Disaster response platforms at district and community

Disaster response platforms at community level have also been set up by the Disaster Secretariat and other related agencies to attend rapidly and effectively to the impending disasters.

12. Cooperation Agreements

a. UNDP Tsunami Flash Appeal grant

Following the signature of the grant on the 18/04/06, NDS is now at the stage of defining a *work plan* of the different activities to be conducted within 2 years. This is currently being done in coordination with relevant local partners.

b. Cooperation agreement with UNOPS (United Nation's Office for project Supervision)

Following the signature of an agreement on the 10/01/06, NDS is now completing the different activities included in this project, notably: Disaster Preparedness Policy, Risk Assessment and Capacity Building. This has to be completed by the end of September 2006.

c. Seychelles – La Réunion

After the roundtable discussions organized by the MFA (20-21/04/06), with a Réunionnais delegation, NDS has defined and submitted its proposal. This proposal is focused on a multi hazard expertise, necessary to complete the RVA currently conducted, which is based on historical data and exhaustive data collection.

d. ISDR Consortium (President Bill Clinton Initiative)

NDS has submitted a proposal, following the receipt of the letter of invitation from President Clinton's secretariat. This proposals will be considered at the Bali meeting in August this year, in accordance with the information given at the Bangkok ISDR Conference (in early June), and with the outputs from the different partners (local and external).

e. French Government

The French Government donated equipment to the value of EURO 40,000. These equipments are being stored at the Fire brigade for training, maintenance and to distribute as and when needed for responding to disasters and emergencies.

13. Major constraints

Existing gaps and constraints and priorities to address them.

There are important gaps at the moment that should be bridged rapidly.

1. The first area of concern relates to the degree of preparedness: even if the policy and the organization are in place, both at national and community levels, and even if the government has shown great commitment to the creation of a new early warning and command centre, all these efforts would be worthless in the absence of a reliable warning system for the communities. Some procedures are currently in place for day warnings (radio, TV, sms); yet, the efficiency of these procedures for a night time warning or to reach outreached communities is a real concern. This was clearly evident on the evening of Tuesday the 18th July 2006 when the secretariat received warning from the Met Office at 11pm, of a potential wave of 50cms hitting the Island of Rodrigues after the Java tsunami. Seychelles was spared of the wave (which did not do much to Rodrigues neither) but in the event that a warning had to be issued at this hour of the night great difficulty would have been encountered. That is why the top priority for consideration is to provide the Disaster Community Platforms with warning dissemination and communication equipment (sirens, loud hailers). Nonetheless, there is further need of specific equipment to improve meteorological predictions.

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2. The second priority highlights the importance of mock exercises, aiming at auditing the organizational vulnerability, human capacity and local preparedness. This implies a real need to improve the communities' awareness and knowledge, in order to make local contingency plans more efficient.

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