

# Tsunami Mock Drill

Vikram Sarabhai Space Centre (VSSC)

28<sup>th</sup> May 2018

Observations and Recommendations





## Introduction

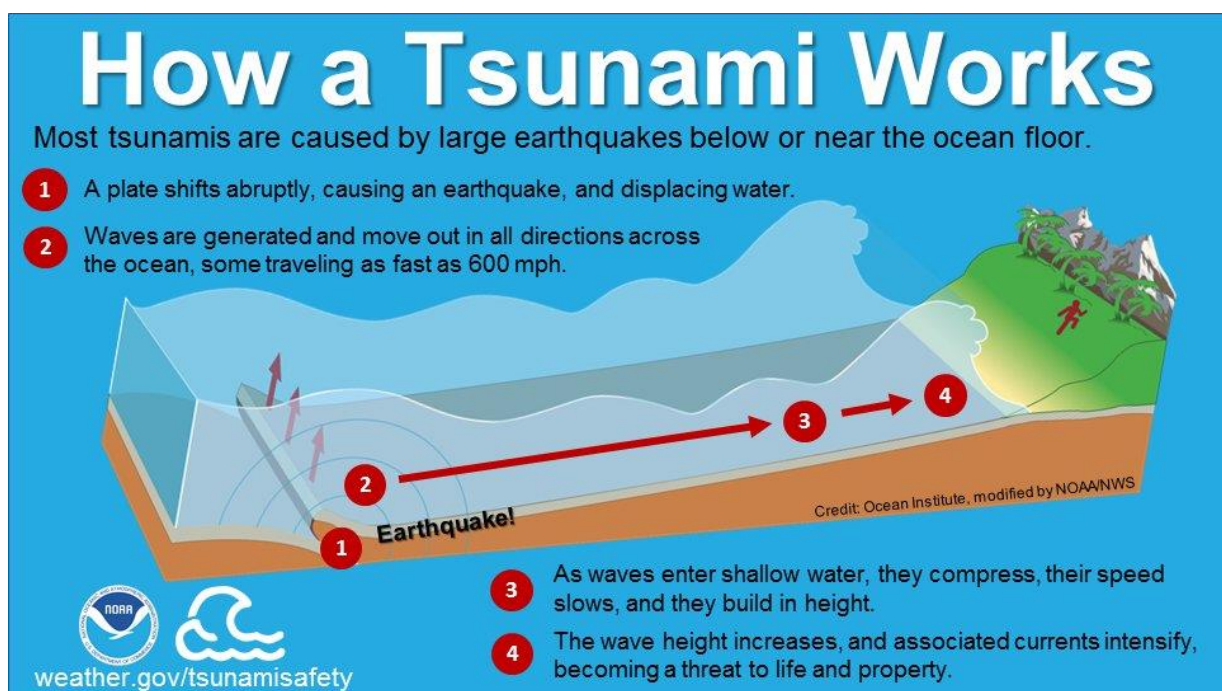
Mock exercises on various types of natural and anthropogenic hazards helps in inculcating a culture of preparedness and generate awareness. Mock exercises will help the institution to assess the preparedness, review the crisis management system, Standard Operating Procedures and to evaluate the readiness of various departments to any disaster or emergency. Mock exercises will also give the opportunity to coordinate the activities of various agencies for their optimum utilization and to use the feedback to identify the gaps and improve the capacities of the system to face an actual disaster situation.

Tsunami mock drill was organised by Vikram Sarabhai Space Centre (VSSC) in coordination with National Disaster Response Force (NDRF), Central Industrial Security Force (CISF) and Kerala State Disaster Management Authority (KSDMA). Other stakeholders who present were Thiruvananthapuram District Administration (DDMA), Police, Fire and Rescue Services, Health Department, Fisheries, Coastal Police, Intelligence and other line departments. The venue of the mock drill was at Vikram Sarabhai Space Centre campus.

The mock drill started at 11.00 AM on 28<sup>th</sup> May 2018 and was concluded by 4.00PM with the debriefing meeting Chaired by Director, VSSC in the Conference hall of Chief Controller.

## Preparatory Meetings

Two preparatory meetings were held at VSSC to plan the drill. All the stakeholders as mentioned above were part of these meetings. The meetings were held on 25<sup>th</sup> April 2018 & 17<sup>th</sup> May 2018. The responsibility of each stakeholder was decided during these meetings. It was decided that KSDMA would issue the bulletins as received from INCOIS (Indian National Centre for Ocean Information Services), Hyderabad which is the central government agency under Ministry of Earth Sciences to issue Tsunami warnings in the country.



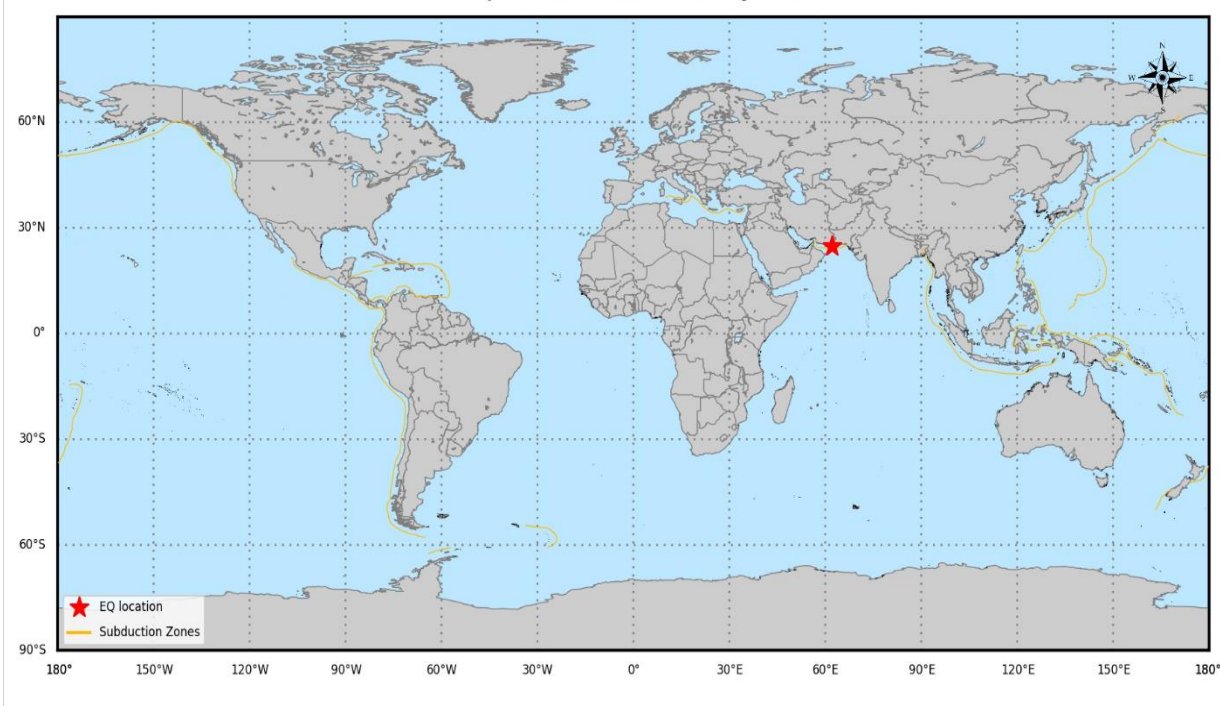
## Tsunami Mock Drill Scenario

Magnitude	9.0 Mw
Latitude	24.8 N
Longitude	62.2 E
Depth	10 km
Origin Time	11:00 IST (05:30 UTC)
Date	May 28, 2018
Wave Height	1.2m at Trivandrum Coast
Hit Time	15:26 hrs
Region	Off Coast of Pakistan

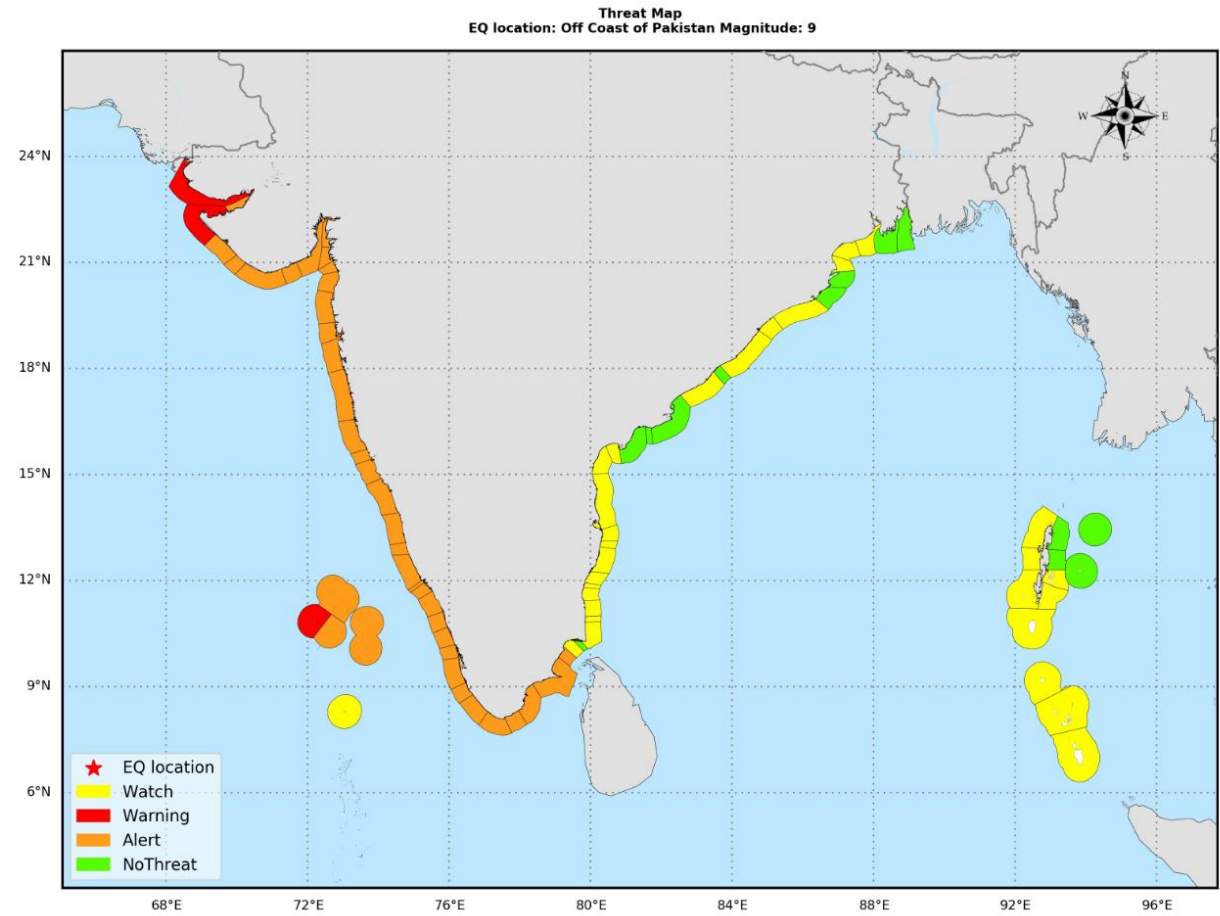
### Bulletin Timelines:

Date	Time IST (UTC)	Bulletin #	Detail
28-May-18	1100 (05:30)		Test Start Earthquake occurs
28-May-18	1105 (05:35)	1	Type-I EQ Bulletin (8.8 M)
28-May-18	1115 (05:45)	2	Type-II EQ + Scenario Results (9.0 M)
28-May-18	1200 (06:30)	3	Type-III EQ + Scenario Results (9.0 M) + WL Obs
28-May-18	1300 (07:30)	4	Type-III Supplementary 01 + Scenario Results (9.0 M) + WL Obs
28-May-18	1400 (08:30)	5	Type-III Supplementary 02 + Scenario Results (9.0 M) + WL Obs
28-May-18	1500 (09:30)	6	Type-III Supplementary 03 + Scenario Results (9.0 M) + WL Obs
28-May-18	1600 (10:30)	7	Type-IV Final Bulletin

**Location Map (Tsunami):**

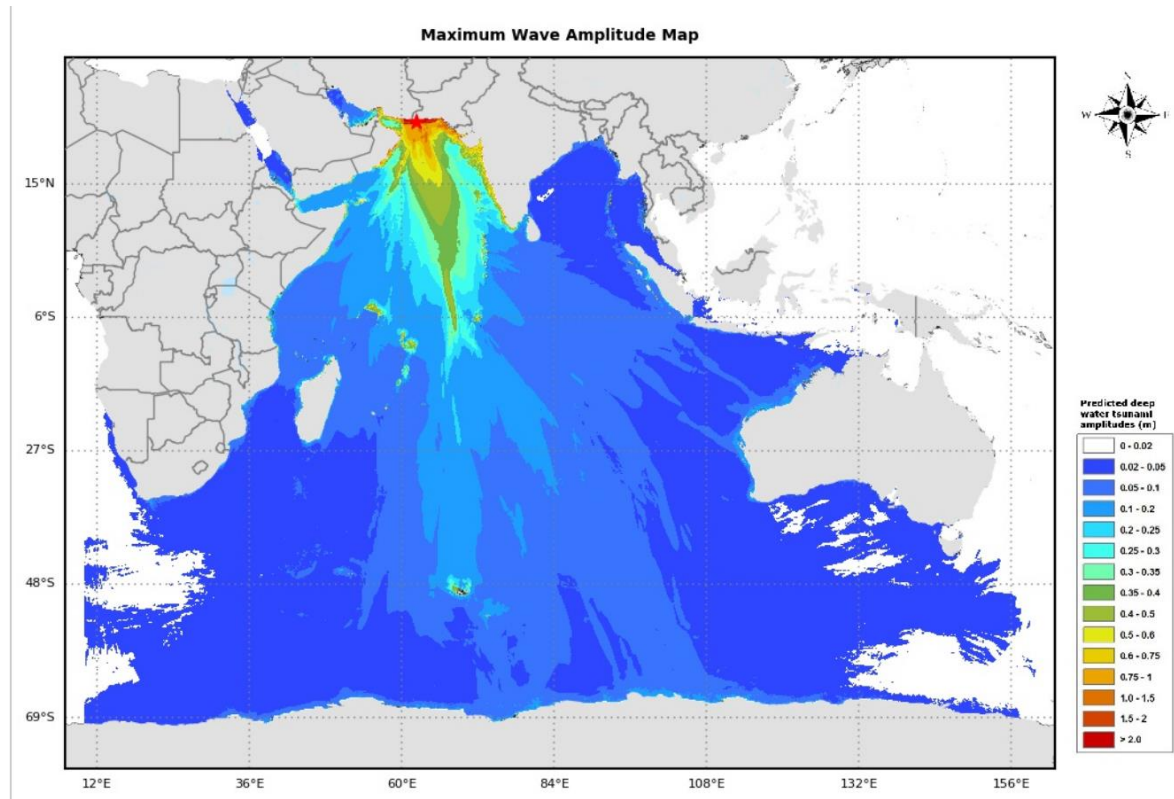


**Threat Map**

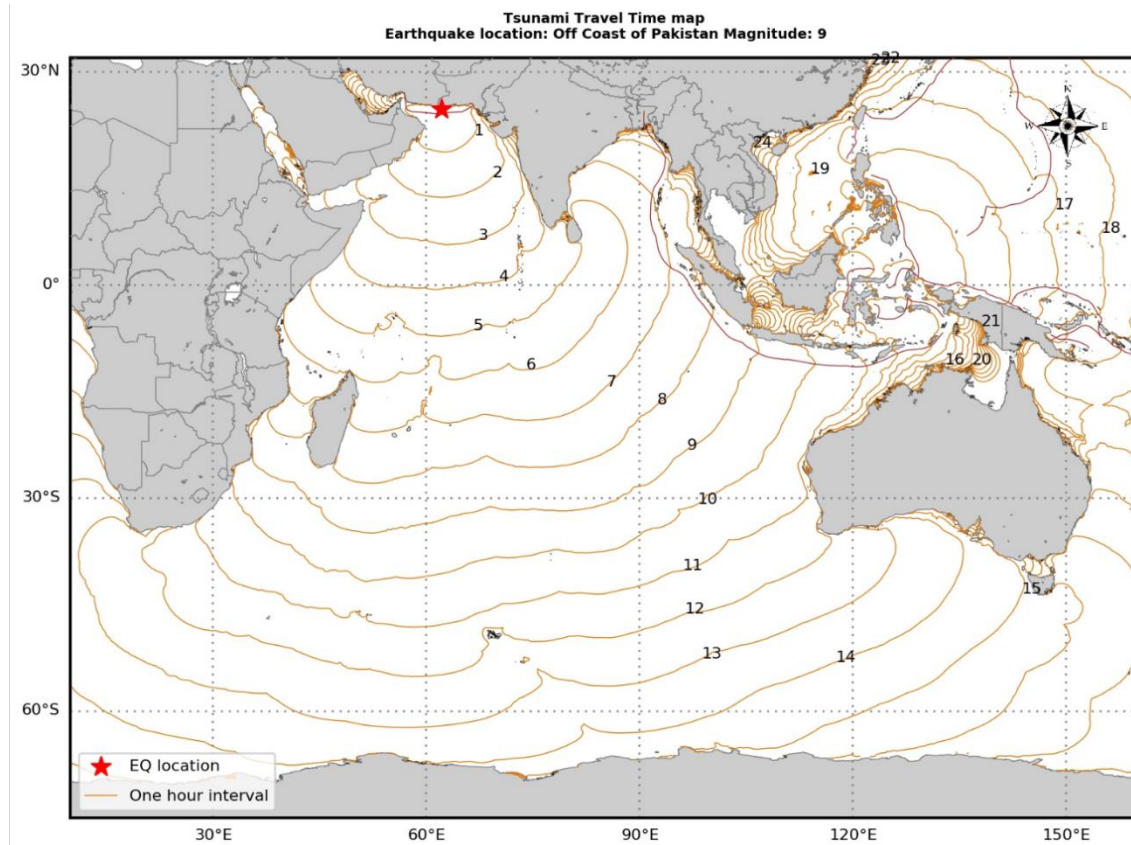




## Maximum Wave Amplitude Map



## Travel time Map



## Observation of the Drill

Independent observers were selected from Fire and Rescue department, Health department, NDRF and KSDMA. The observers were stationed in 4 different locations in the campus to observe the drill and to provide constructive feedback.

## Observations & Recommendations

### i) Familiarising of Terminologies

Observation	Recommendation
The common terminologies used during a tsunami warning phase like 'Watch', 'Alert' and 'Warning' were not very familiar with the staff of VSSC.	As the tsunami warning has various stages like Watch-Alert-Warning according to the SOP of INCOIS and SDMA, these stages and its corresponding advisories may be made familiarized by the staff by way of trainings/awareness sessions etc. (Link to SDMA SOP - <a href="http://sdma.kerala.gov.in/wp-content/uploads/EOCESFP2015-Edition-2.pdf">http://sdma.kerala.gov.in/wp-content/uploads/EOCESFP2015-Edition-2.pdf</a> )

### ii) Hazard, Vulnerability & Risk Assessment

Observation	Recommendation
A detailed hazard, vulnerability & risk assessment of VSSC campus is not available.	Hazard, vulnerability and risk assessment is the combined process of quantifying the spatial-temporal return probabilities of various hazards, the expected degree of damage that a given element or set of elements-at-risk is exposed to and the expected monetary losses when a given area is exposed to hazards within a given period of time. Hazard, Vulnerability & Risk Assessment of the VSSC campus is recommended to scientifically analyze the hazards and risk. Trivandrum City HVA report prepared by SEOC is available in this link as an example – <a href="http://sdma.kerala.gov.in/wp-content/uploads/HVATvm2016.pdf">http://sdma.kerala.gov.in/wp-content/uploads/HVATvm2016.pdf</a>

### iii) Media Management

Observation	Recommendation
Media Management – The mock drill did not engage media.	In an emergency/disaster, media plays an important role as they carry the News to the

	outside world. Media management itself is a matter to be considered while conducting mock drills. PRO or any other staff shall be designated for this purpose when such drills are conducted.
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**iv) First Aid skills**

Observations	Recommendations
First Aid Skills – The drill was largely using the human resources of the health department in providing first aid to the mock victims.	Though providing First Aid is the responsibility of the Health staff, it is recommended that all the staff of VSSC to be trained in basic life support (BLS) & First Aid so that all the staff are aware about the appropriate skills to be used in an emergency. This will be of use for personal safety too. Along with First Aid skills, Survival skills during disasters are also important. DO's and DONTs in each disaster may be familiarized. (eg: STOP-DROP-HOLD ON in the event of an earthquake; STOP-DROP-ROLL when you are caught with Fire).

**v) Alert system**

Observations	Recommendations
The warnings given through the loud speaker of in-house Fire and Rescue team was not audible, also the message was not clear. (Location Ref: Brahmaprakash complex)	Adequate number of PA systems shall be made available for timely dissemination of the warning and evacuation of the staff from the affected area. The existing PA system shall be checked for better efficiency.

**vi) Warning Dissemination**

Observations	Recommendations
Warning dissemination: During the debriefing, it was shared that the warning was disseminated to the staff via SMS, however, due to heavy traffic in the mobile network, most of them did not receive the SMS on time. It was learnt that around 4000 SMS's were sent during the drill.	Though SMS is a good medium of communication during an emergency, recipients should be limited to the Heads of the departments/Section officers as the case may be. They can then disseminate further to the employees working under them.

**vii) Head Count**

Observations	Recommendations

Head Count after the evacuation was not taken.	Though evacuation was done from pre-designated locations/buildings and were brought to the safe shelters, head count (attendance) was not taken to ensure that all are safe and no one is left behind. This is highly recommended.
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**viii) Frequency of Drills**

Observations	Recommendations
It was learnt that drills on natural hazards were not done at VSSC apart from anthropogenic disasters, like fire.	It is recommended to have two drills in a year to assess the institutional preparedness and to validate standard operating procedures.

**ix) Special assistance for the vulnerable**

Observations	Recommendations
Staff who need special assistance were not pre-identified during the drill.	Those who are vulnerable are the worst affected in any disaster. Special care shall be taken to pre-identify them and assistance should be provided in priority for such people in an event of any emergency. Eg: Person with disability. Assign

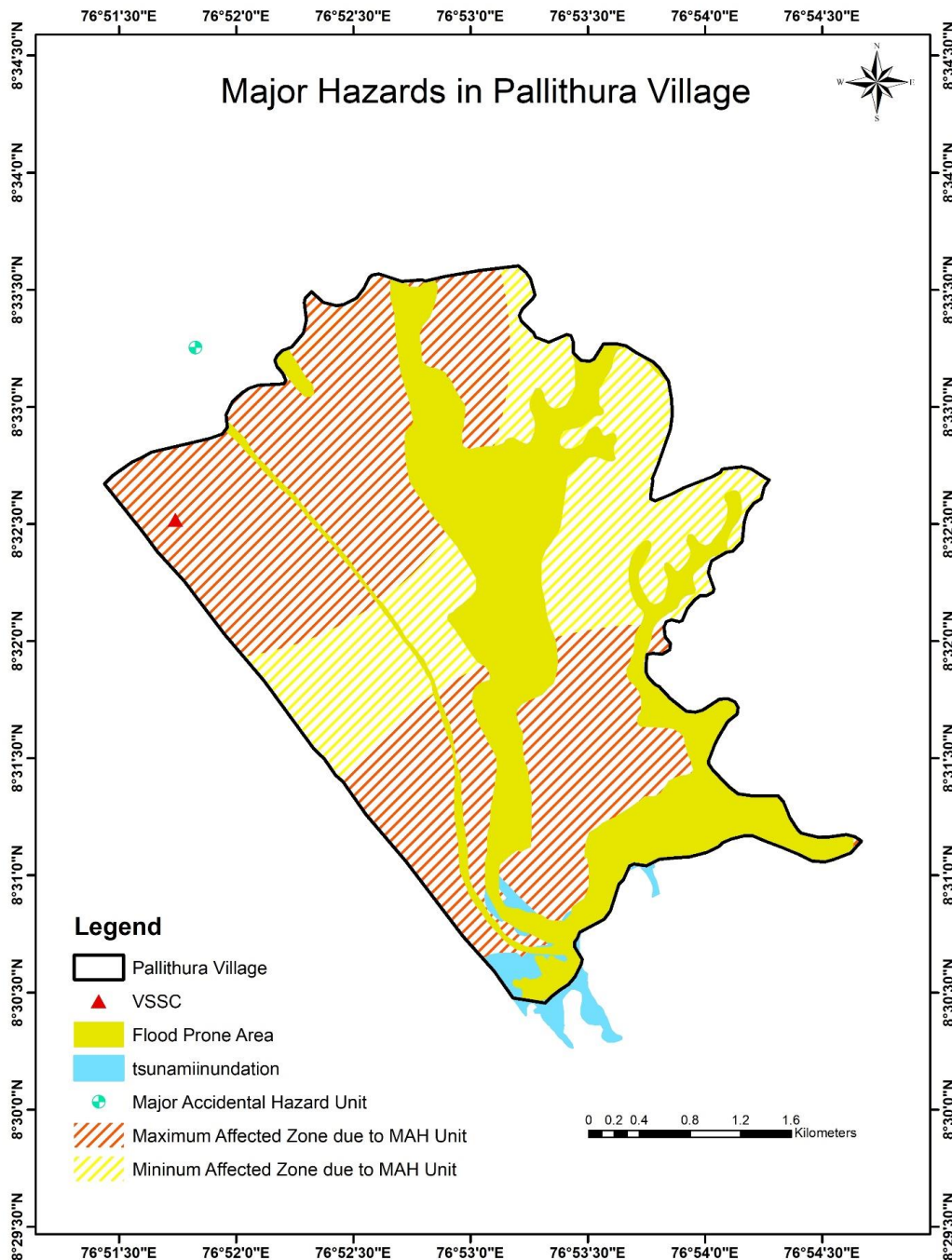
**General observations are as follows**

1. The preparedness of the drill was done rigorously with all stakeholders including NDRF & KSDMA. Two preparatory meetings were held to discuss in detail about the execution of the drill.
2. VSSC was already having a crisis management plan and the SOP of Tsunami was prepared prior to the drill, hence this was followed in the drill.
3. Participation of various stakeholders of the state government was seen during the drill.
4. The announcement of the drill (on 28<sup>th</sup> May) was made on the VSSC website which will prevent any rumour about an actual event.
5. Active involvement of the staff of VSSC was observed throughout the drill, especially during the debriefing meeting, Director VSSC chaired the meeting to listen to the feedback by the observers.
6. Training & Capacity building programmes of the staff were conducted prior to the drill by NDRF, which is important in creating awareness about various hazards.
7. During the drill the casualty / triaging area was cordon off, restricting public or onlookers disrupt the first aid procedures.



## Assessment done at State Emergency Operations Centre


On the occasion of the drill, SEOC analysed the probability of hazards with the existing resources. VSSC falls under Pallithura village. Location wise VSSC is located 250meters away from coast. Based on past historical database (NCESS, Tsunami 2004) and the distance from the coastline makes VSSC is least vulnerable to Tsunami. It comes under moderately drought affected and least affected by lightning as per the drought prone area map and lightning frequency map<sup>1</sup> respectively. As seen in the map, VSSC is located far from flood prone areas identified by NCESS<sup>2</sup>. VSSC is highly vulnerable to the Major Accidental Hazard (BPCL, Kochuveli) unit, in case of leakage hazardous chemicals.



<sup>1</sup> According to the Hazard & Vulnerability Assessment of Thiruvananthapuram City; KSEOC; 2015

<sup>2</sup> National Centre for Earth Science Studies

Annexure 1: SOP – Tsunami (Followed by SDMA – given for reference)

<b>Source of Information – INCOIS: <a href="http://www.incois.gov.in/Incois/tsunami/eqevents.jsp">http://www.incois.gov.in/Incois/tsunami/eqevents.jsp</a></b>		
 <b>TSUNAMI!</b>	<b>Warning</b>	<p><b>Most vigil</b> - Actions to be taken and sustained till warning is withdrawn in the villages/taluks/districts predicted to be affected by the tsunami</p> <ul style="list-style-type: none"> <li>• SEOC – Telephonically verify the certainty of the warning from INCOIS</li> <li>• SEOC &amp; DEOC – Emergency time functions activated</li> <li>• State-District-Taluk Control Rooms of Revenue and Police – 24 hours functioning</li> <li>• NDRF, SDRF and Coastal Police – deployed to the coastline</li> <li>• Army, Navy, Air Force and other central forces in the state – deployed to the coastline</li> <li>• BSNL and Police – deploy emergency communication systems</li> <li>• Hospitals, CHCs and PHCs in the districts predicted to be affected by the cyclone – function at full strength 24 hrs as per requirements by making necessary human resource arrangements from district level. Medical teams should be kept ready for field level disaster management. Ensure control measures for epidemic prevention</li> <li>• Tahasildar – evacuate public within 250 m from the coastline to the relief camps and other safe higher ground and start the relief camps</li> <li>• Local Self Governments – evacuate public within 250 m from the coastline to the relief camps and other safe higher ground</li> <li>• Department of Ports and Harbour Engineering – Move all seafaring vessels to deep ocean</li> <li>• KSEB &amp; PWD – Emergency repair teams to be ready for deployment</li> <li>• District Officers of KSEB, PWD, Health, Irrigation, Transport, Ports and Harbour Engineering – to be available at the respective district collectorates</li> <li>• Police – Stop vehicular traffic other than that of emergency services to the area predicted to be affected; ensure strict oneway system for vehicle movement</li> <li>• Declare holiday for all educational institutions in the taluks predicted to be affected by the event</li> <li>• All mass gatherings and social events in the taluks predicted to be affected by the event to be stopped</li> <li>• Public within 250 m from the coastline to move to higher ground and further inland</li> <li>• Tourism Department – Close all resorts within 250 m of the coastline and low lying areas in river-mouths/coastal estuaries and evacuate public to safer areas</li> </ul>
	<b>Alert</b>	<p><b>Be prepared</b> - Actions to be taken and sustained till warning is withdrawn, in the villages/taluks/districts predicted to be affected by the tsunami</p>

		<ul style="list-style-type: none"> <li>• SEOC – Telephonically verify the certainty of the warning from INCOIS</li> <li>• SEOC &amp; DEOC – Emergency time functions activated</li> <li>• State-District-Taluk Control Rooms of Revenue and Police – 24 hours functioning</li> <li>• SDRF &amp; Coastal Police – deployed to the coastline</li> <li>• Army, Navy, Air Force and other central forces in the state – on high alert and standby</li> <li>• BSNL and Police – ready to deploy emergency communication systems along the coastline</li> <li>• Hospitals and PHCs on higher ground outside 250 m from coastline in the districts predicted to be affected – function at full strength 24 hrs as per requirements by making necessary human resource arrangements from district level. Medical teams should be kept ready for field level disaster management. Ensure control measures for epidemic prevention</li> <li>• Tahasildar – be prepared to start relief camps and evacuate public to higher ground outside 250 m from coastline</li> <li>• Local Self Governments – Advice public within 250 m from the coastline to prepare for moving to higher ground</li> <li>• Department of Ports and Harbour Engineering – Move all seafaring vessels to deep ocean</li> <li>• KSEB &amp; PWD – Emergency repair teams to be ready for deployment</li> <li>• District Officers of KSEB, PWD, Health, Irrigation, Transport, Ports and Harbour Engineering – to be available at the respective district collectorates</li> <li>• Police – Regulate vehicular traffic other than that of emergency services to the area predicted to be affected</li> <li>• Declare holiday for all educational institutions in the taluks predicted to be affected by the event</li> <li>• All mass gatherings and social events in the taluks predicted to be affected by the event to be stopped</li> <li>• Public within 250 m from the coastline to be ready to move to higher ground</li> <li>• Tourism Department – Alert all resorts within 250 m of the coastline and low lying areas in river-mouths/coastal estuaries that they may have to close if the warning is increased to alert status</li> </ul>
	<b>Watch</b>	<p><b>Be updated</b> - Actions to be taken and sustained till warning is withdrawn, in the villages/taluks/districts predicted to be affected by the tsunami</p> <ul style="list-style-type: none"> <li>• SEOC &amp; DEOC – Keep checking the tsunami bulletins from the INCOIS website</li> <li>• State-District-Taluk Control Rooms of Revenue and Police – 24 hours functioning</li> <li>• All concerned district administrations and nodal departments listed above to be on alert mode</li> </ul>
	<b>Threat Passed</b>	<p>SEOC – cross check with INCOIS that the threat has passed  DEOC – cross check with SEOC that the threat has passed</p>



## Annexure 2 | Bulletin Sample from INCOIS

```
#####  
#  
# TEST TEST TEST - - NOT A REAL TSUNAMI EVENT  
#  
#####
```

```
-----  
TEST TEST TEST TEST TEST TEST TEST TEST TEST TEST TEST TEST  
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```

```
TSUNAMI BULLETIN NUMBER 1  
INDIAN TSUNAMI EARLY WARNING CENTRE (ITEWC)  
ISSUED AT 1105 IST MONDAY 28 MAY 2018  
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```

```
... EARTHQUAKE BULLETIN ...
```

### 1. EARTHQUAKE INFORMATION

ITEWC-INCOIS has detected an earthquake with the following preliminary information:

Magnitude: 8.8 M  
Depth: 10 km  
Date: 28 MAY 2018  
Origin Time: 1100IST  
Latitude: 24.8 N  
Longitude: 62.2 E  
Location: OFF COAST OF PAKISTAN

### 2. EVALUATION

Earthquakes of this size sometimes have potential to generate tsunamis. However, so far there is no confirmation about the triggering of a tsunami. An investigation is under way to determine if a tsunami has been triggered. ITEWC INCOIS will monitor sea level gauges near epicenter and report if any tsunami wave activity has occurred.

### 3. ADVICE

This is only a Heads-up message to the national/state/local authorities and disaster management offices. No immediate public action is required. This Bulletin is being issued as an advice. Only national/state/local authorities and disaster management offices have the authority to make decisions regarding the official threat status in their coastal area and any action to be taken in response.

### 4. UPDATE

Additional bulletins will be issued by ITEWC INCOIS for this event as more information becomes available.

### 5. CONTACT INFORMATION

INDIAN TSUNAMI EARLY WARNING CENTRE (ITEWC)  
INDIAN NATIONAL CENTRE FOR OCEAN INFORMATION SERVICES (INCOIS)  
ADDRESS:"OCEAN VALLEY", PRAGATHI NAGAR (BO), NIZAMPET (SO),  
HYDERABAD - 500 090, INDIA  
PHONE: 91-40-23895011  
FAX: 91-40-23895012  
EMAIL: tsunami@incois.gov.in  
WEB: www.incois.gov.in

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END OF BULLETIN  
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### Annexure 3 | Photographs of the Drill



#### Observers from KSDMA

Joe John George, State Project Officer & Dr Sreeja M U, Hazard Analyst

“Concern for man and his safety must always form the chief interest of all technical endeavour: never forget this in the midst of your diagrams and equations” – Albert Einstein