Role of DMOs & Media in Tsunami Early Warning System

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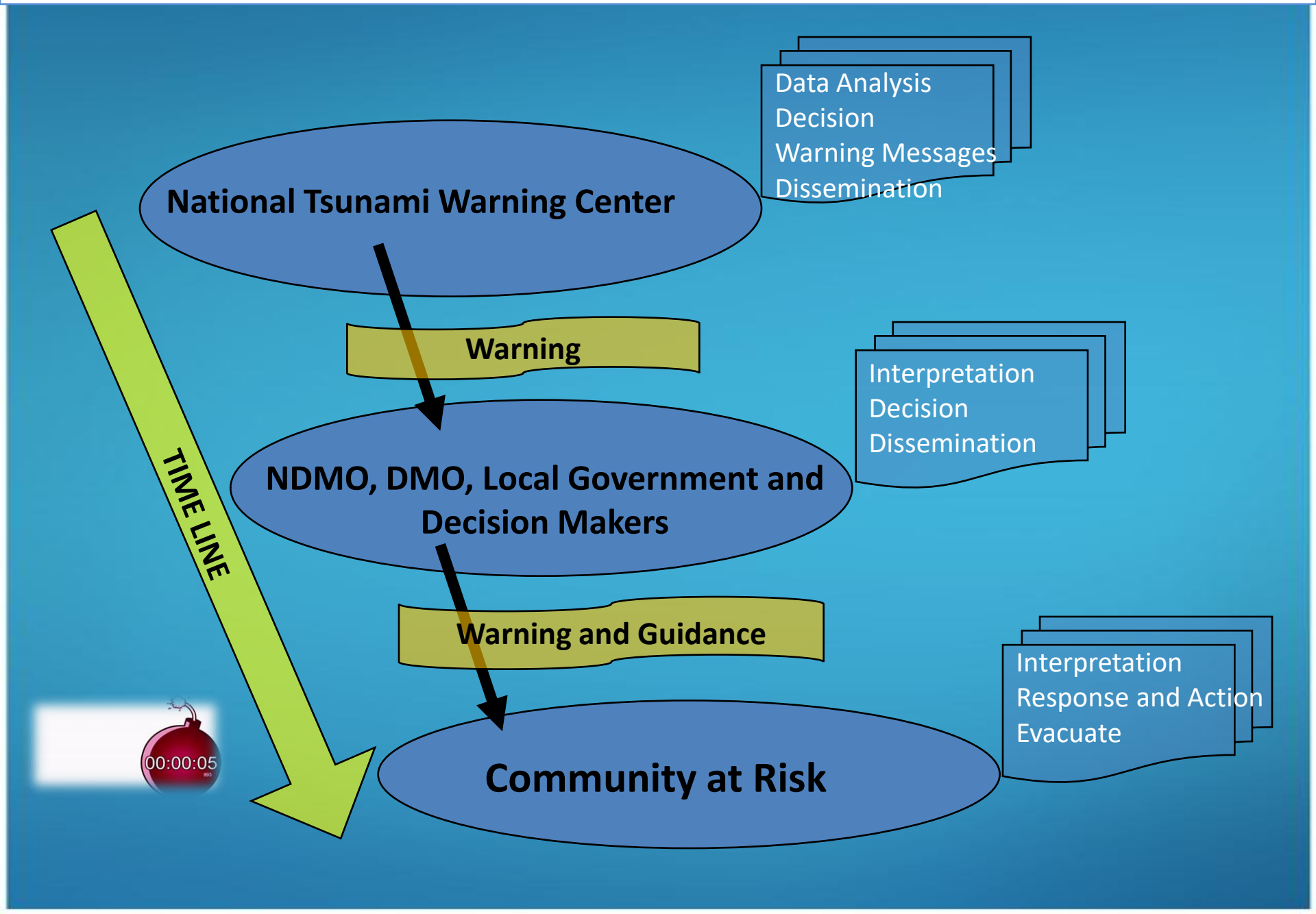
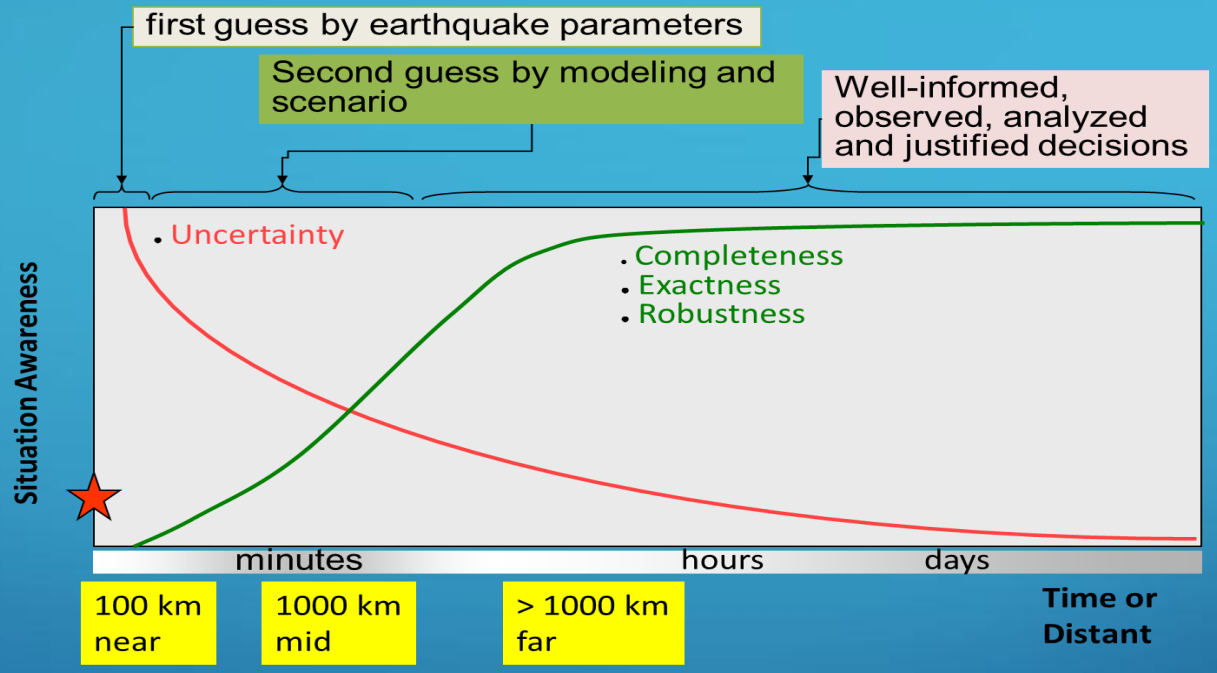
Warning Chain….



Warning Centre Limitations

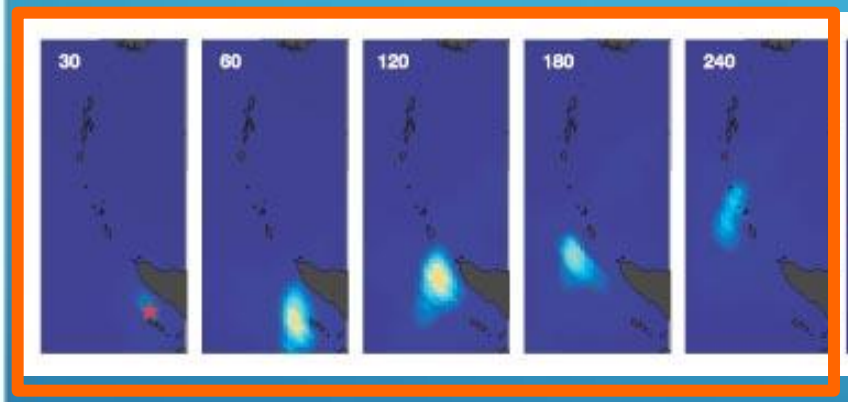
- Warning Centre is “Eyes and Ears” for earthquake / tsunami
- **The Tsunami Warning Center** detects Earthquakes and evaluate tsunami potential, looks for sea-level changes and issue Warning messages
- **Limitations include**
  - Lack of timely data
  - Lack of time to properly analyze data before wave impact



Challenges in Tsunami Warning –
Fast Warning for Gigantic Earthquakes

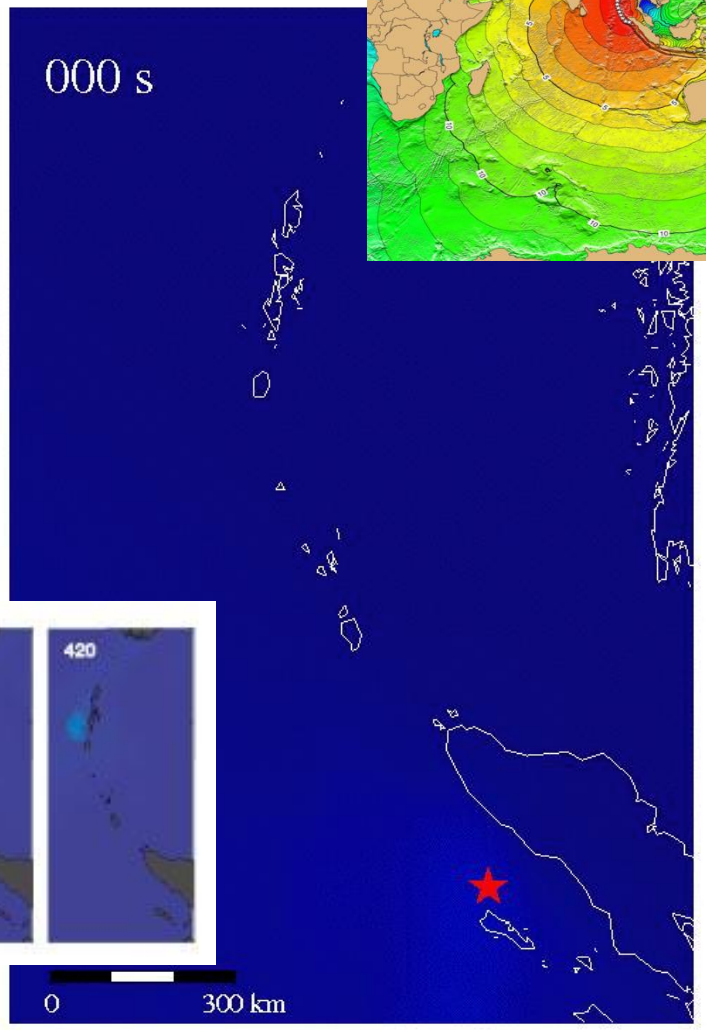
December 26, 2004

- Complex Rupture
- Discontinuous in time (8 min) space (1000 km)
- **At 3 min, EQ still rupturing so magnitude (and forecast) underestimated**



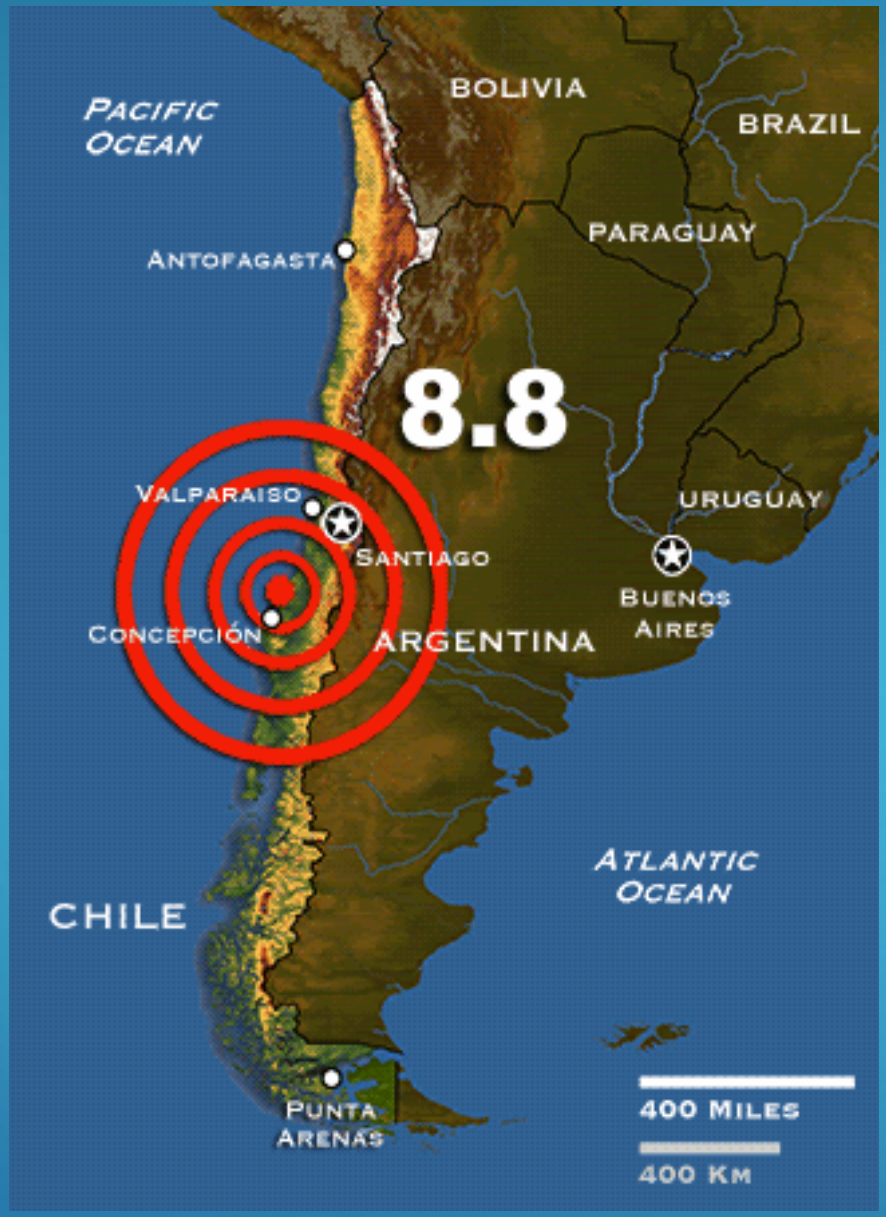
Ishii et al, 2005

5 MIN

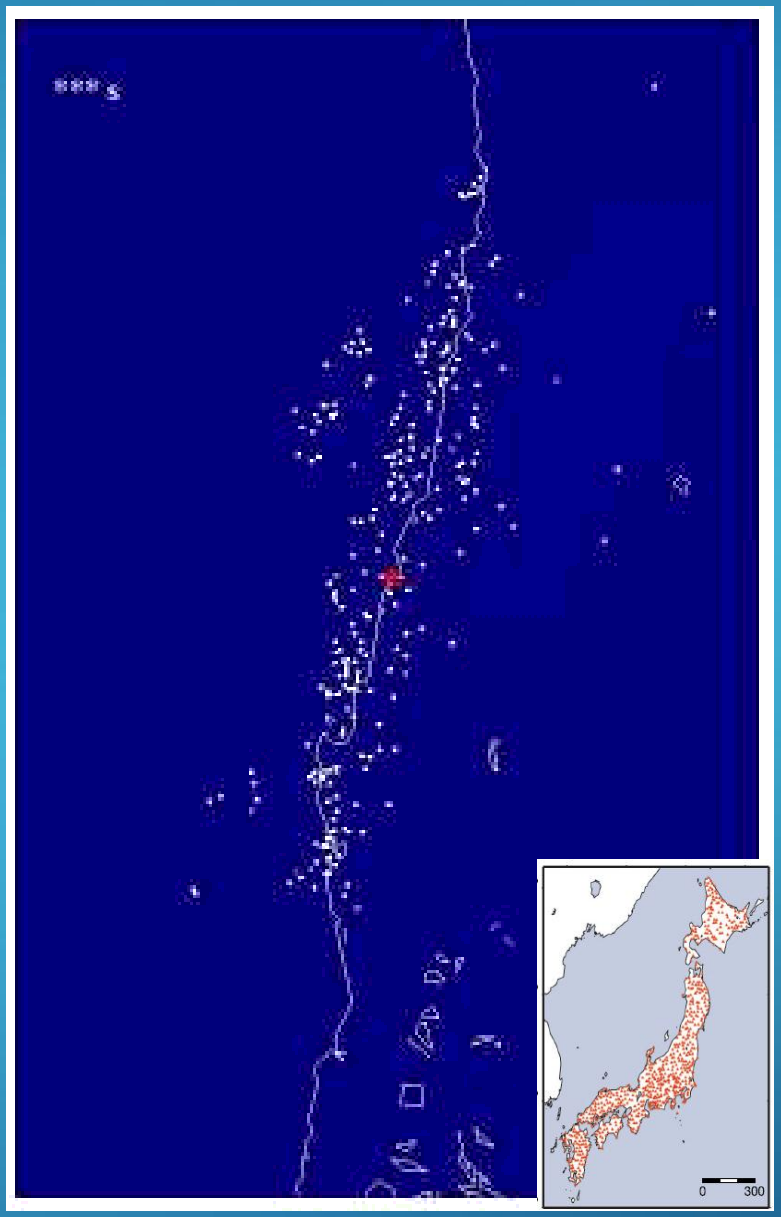


Energy Release Imaged by Japan HINET Array

2010 Chile earthquake

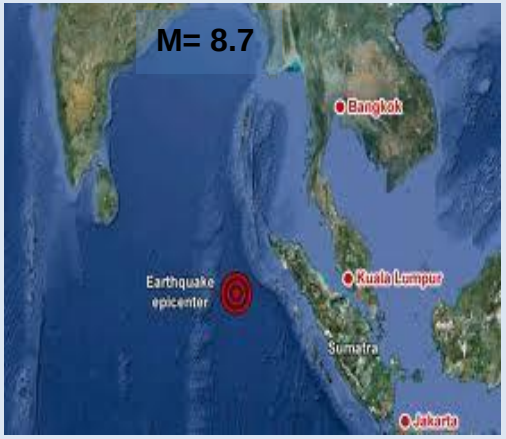


Energy Release imaged by Japan HINET Array, Ishii et al, 2010

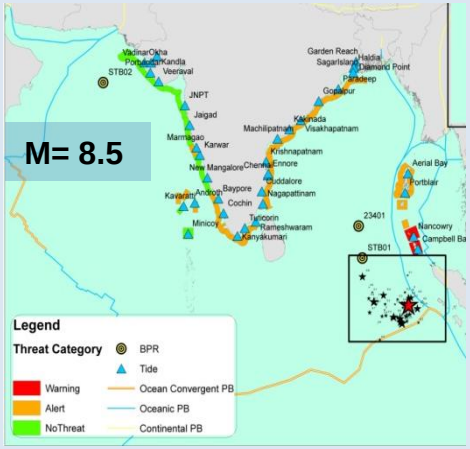


2012 Northern Sumatra earthquake

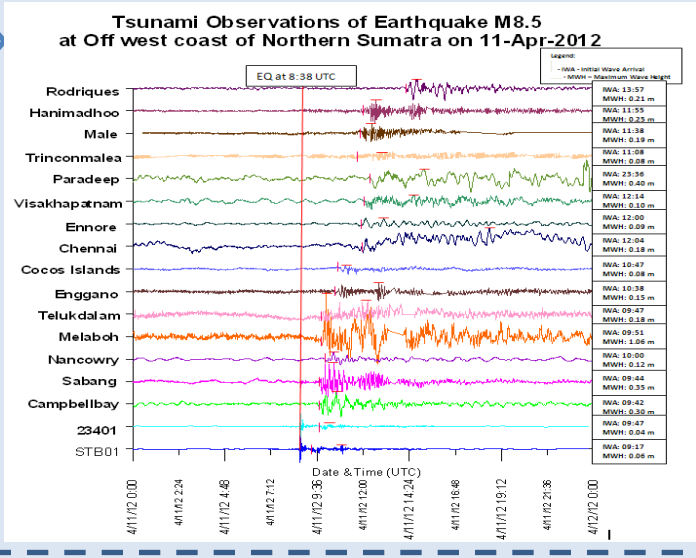
The first Warning in 8 minutes → **Updated warning in 65 minutes**



April 11, 2012, Northern Sumatra



Little Nicobar, Indira Point > 2m

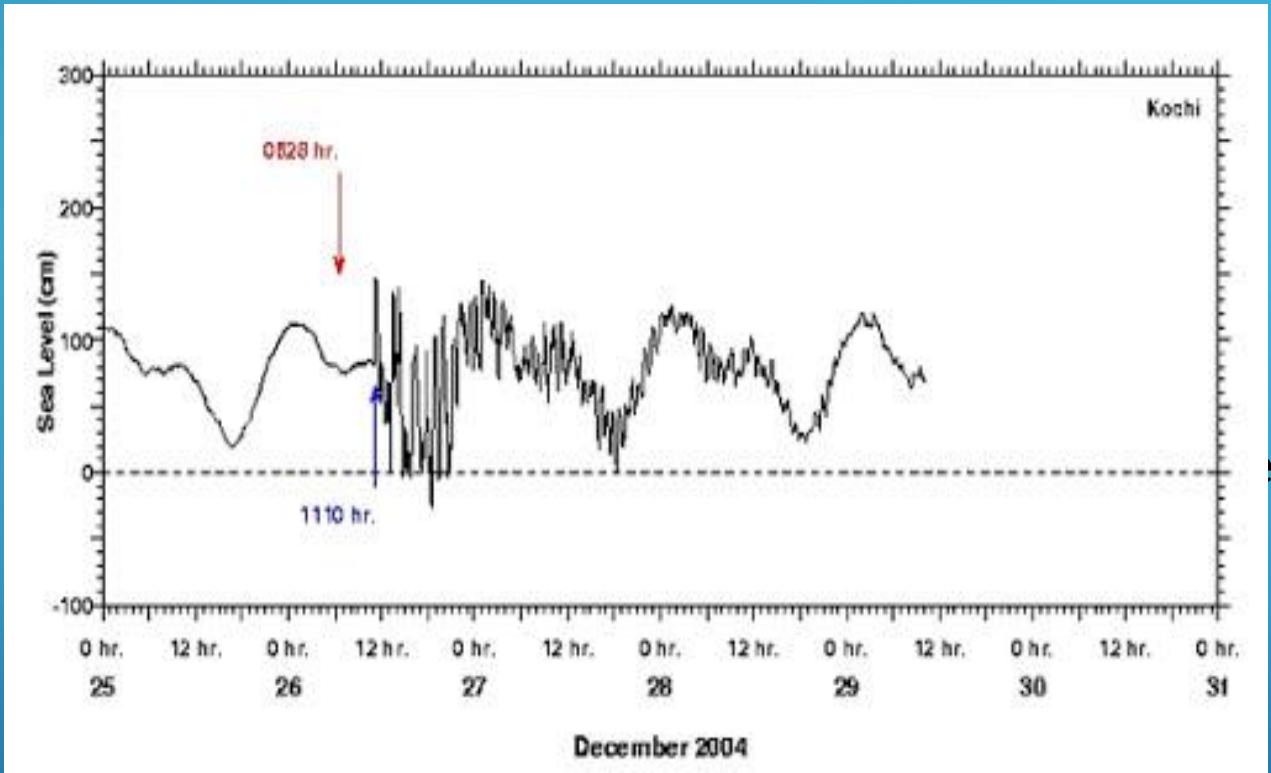


Observed Tsunami Amplitude

Over-estimation of Tsunami wave heights

- The first tsunami warning was given in 8 minutes, it was based on magnitude of 8.7
- Announced tsunami amplitude estimate " > 2m" at Andaman & Nicobar Islands
- Overestimated tsunami amplitudes since they were based on worst case scenario
- The actual displacement was in horizontal direction, hence only minor tsunami (30 cm at Campbellbay)

Challenges in Tsunami Warning – Confirming Destructive Tsunamis

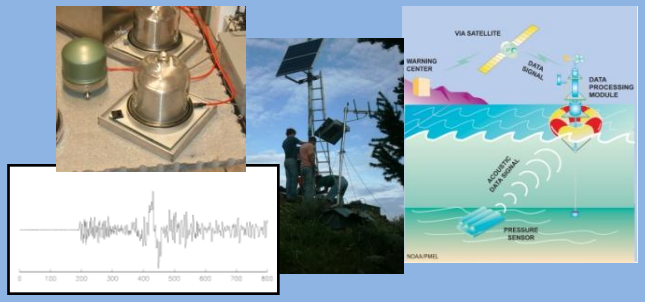
- Sea Level Measurements are Critical for:
  - Tsunami Detection (Yes or No)
  - Tsunami Measurement (Arrival Time, Amplitude, Period, Duration)
- 

The Major Tasks

Our TWO major tasks:

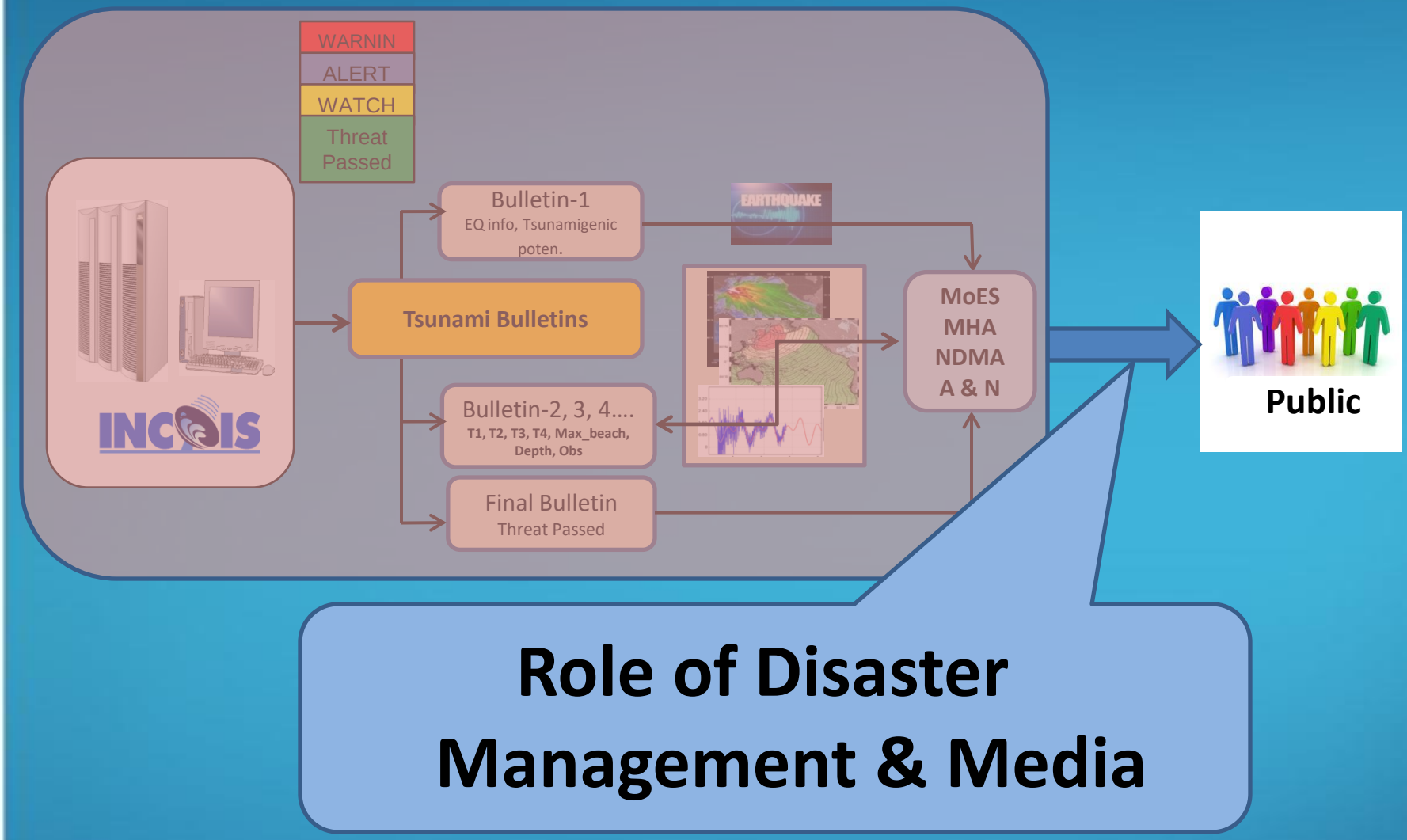
1. **Identify, detect, verify/predict, warn, evacuate**
2. **Raise awareness and preparedness**

A perfect warning will be useless if people do not know what to do in case of an emergency



Awareness and preparedness at the country/community level is essential

Last mile connectivity



Role of Disaster Management & Media

INCOIS

Role of Disaster Management Offices (DMOs)

NDMA
MHA
NEC
NEOC
SEOC
DEOC
SDM
BDO

- **Translators** of scientific and technical information into common understandable information
- **Key players** to ensure public safety **Prior – During – After the event**
- **Controllers** having direct interaction with the public
- **Decision Makers** to assess information available and take actual appropriate decision on tsunami emergency

DMOs Expectations

➢ DMO's Key Question

- Tsunami generated?? YES or NO?
- If Yes, then Evacuation needed? YES or NO?
  - Who should evacuate?
  - Where to evacuate to?
  - When to evacuate?
  - How to notify? How/when with media?
  - How to confirm it is safe?
  - How to notify? How/when with media

➢ Decision Making Environment

- DMOs want "black & white, yes or no answers."

- TWC are operating in "shades of grey color."

General Timeline-driven SOP

TSUNAMI ACTION TIME LINE	TIME min after EQ	OBSERVATION	NTWC ACTION		ACTION NDMO / Local Authority
	0	Strong ground shaking locally			
	1-5		EQ Alarm triggers	DETECTION	
	5-10	Tsunami might come	Bulletin-1	EQ Information Potential to generate tsunami	
	10-30		Bulletin-2 (Forecast)	WARNING	EVACUATION
	30-60	Tsunami confirmed	Bulletin-3 (SL obs)	Confirm Dangerous Tsunami	
	1-2+ hrs		Bulletin-4 (SL obs)	Monitor and report SL obs	
	2-8+ hrs /day	Dangerous waves stop	Final Bulletin (SL obs)	Threat Passed	Search and Rescue
	8+ hrs / days	Safe to Return			ALL-CLEAR

SOP – Public Response and Threat Levels in Bulletins

Threat Status	Action to be taken	Dissemination to
WARNING	Public should be advised to move inland towards higher grounds. Vessels should move into deep Ocean	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media
ALERT	Public should be advised to avoid beaches and low-lying coastal areas. Vessels should move into deep Ocean	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media
WATCH	No immediate action is required	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Media
THREAT PASSED	All clear determination to be made by the local authorities	MoES, MHA, NDMA, NCMC, NDRF Battalions, SEOC, DEOC, Public, Media

WARNING

ALERT

WATCH

THREAT PASSED

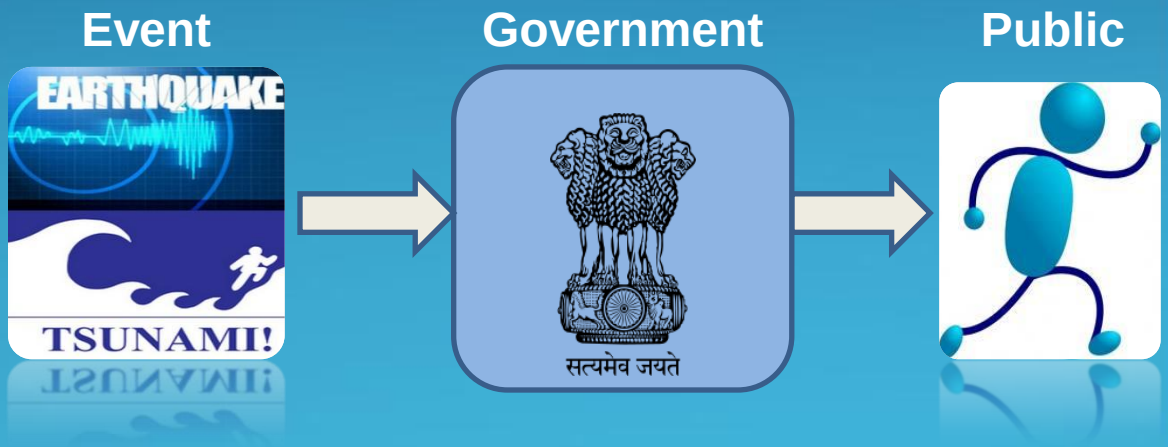
What to Expect - Reality

- Tsunami strikes within minutes after earthquake
- Earthquake infrastructure damage
- Little or no official warning in a timely manner
- Emergency Operation Center (EOC) not activated to enable an evacuation during non-duty hours
- Little to no response personnel available to support evacuation
- Communication system overloaded or breakdown
- People panicking (public & response personnel)
- **Earthquake ground shaking means**
  - Roads impassable and bridge damaged
  - Buildings collapsed or severely damaged
  - Utility and communications systems disrupted or destroyed
- **Tsunami means**
  - Series of waves striking the coastline for hours
  - Debris (floating)
  - Additional damage adding to earthquake impacts

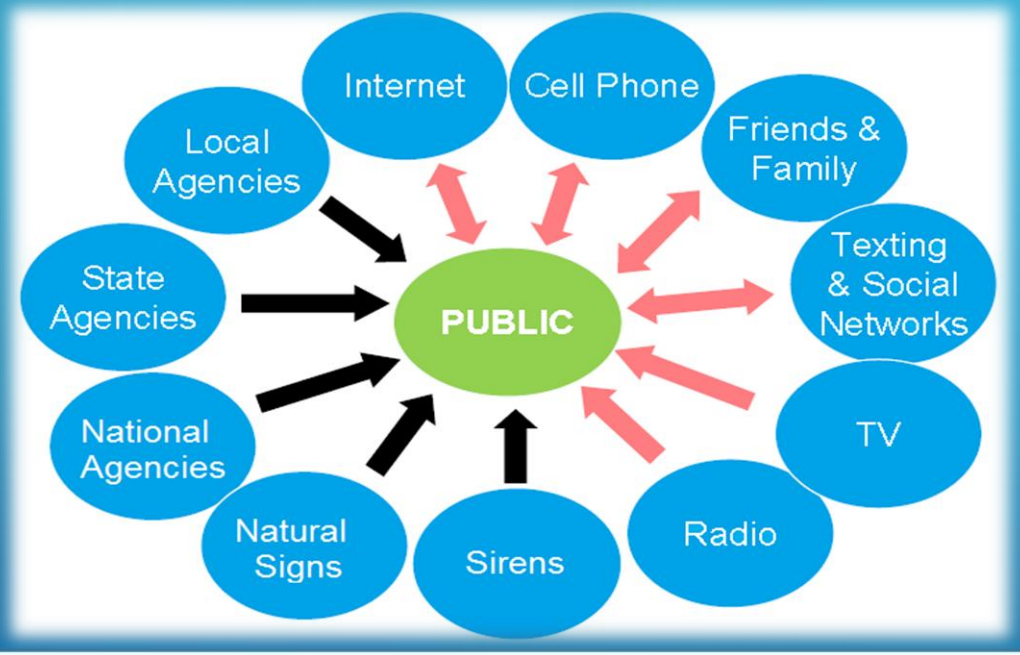
How People Get Warnings

Assumption

- Official information
- Information flow is linear from one source (INCOIS)



Reality



- Official & Informal (unofficial) information
- Information flow is from many sources at same time

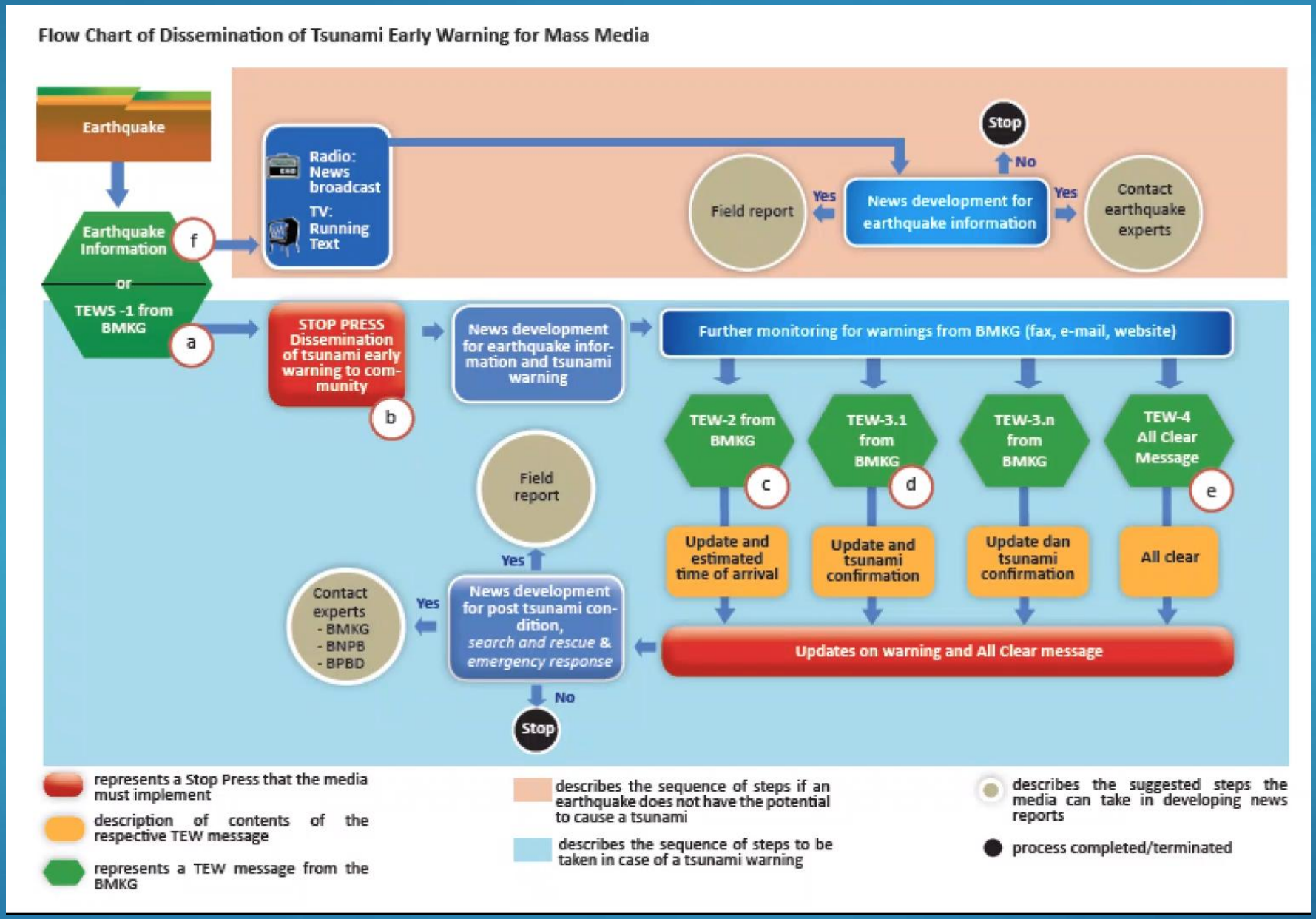
INCOIS

Role of Media

Roles and Responsibilities of Media

- SOP for reporting the emergency
- Real-time image of the disaster
- Early warning beacon
- Bridge of communication
- Communicate the risk (timely and reliable)
- Sharing platform for concern and support
- Motivate the others to help the victims
- During disaster.. It's time to help the victims not the time to criticize either government or public
- Pre/Post disaster – awareness activities / discussion panels regarding disaster to mitigate the impact
- More publicity to preparedness
- Announce appeals of aid

Sample Media SOP



Tips for covering the tsunami emergency

- Media should have the SOP to report the tsunami emergency which is different from other disasters
- Establish Emergency procedures/plans
- Communicate with nodal agency (NDMA/LDMA/INCOIS) responsible for issuing advisories
- Check the equipment to avoid communication failure
- Report about safe areas, evacuation routes etc.
- Keep the news desk informed about what is going on
- Keep stories simple and do not put in your own emotions
- Be sensitive to people's suffering
- Think of follow-ups

What Media should know before tsunami emergency

- Who will issue the warnings?
- What communication systems/media will be used to issue warnings?
- How will the warnings be issued?
- When will the warnings be issued?
- What will the warning messages say?
- What actions to undertake upon receipt of warnings?
- When will the All Clear be issued?

What Public Needs to Know

- Official sources of tsunami information
- Evacuation maps & routes
- Local / Distant tsunami response differences
- Natural Warning signs
- Warning systems for the community
- What sirens sound like and verbal message (regular testing)
- How to respond to siren sounding
- Community support network / orgs

Be Prepared…

- Know **which areas are safe** and which are not
- Know the **hazard zones, evacuation routes**, and locations of the nearest high ground, tsunami shelter and/or assembly area where you live/ work.
- Learn and **practice** the safe **walking route to shelter** and assembly areas
- Create and practice a **family emergency plan**
- Have a portable **disaster supplies kit**
- Be sure to teach your children about how understand the **evacuation plans**
- **Sign up to receive** Tsunami Warning Center email or text **messages**

Local Challenges

April 11, 2012
in Banda Aceh

Ironic Panic shown by Banda Aceh people tried to go to safer place (kompas.com) very few going to vertical evacuation shelter

How to Improve Tsunami Response

- Conduct tsunami awareness programs in schools, hospitals, fairs, workshops, and community meetings
- Define tsunami evacuation areas and evacuation routes
- Practice tsunami evacuation drills at least once every 2 years when located within the tsunami hazard zone
- Educate people to avoid new development in tsunami vulnerable areas to minimize future tsunami losses

Figures : Hilo, Hawaii, was destroyed by tsunamis in 1946 and 1960. Today, the area is an open space park


National/Local
Govt.
Tsunami Warning
Centre
Community at
Risk

Thank You