TSUNAMI DISASTER EXPERIENCE AND RISK MANAGEMENT POLICY IN INDONESIA

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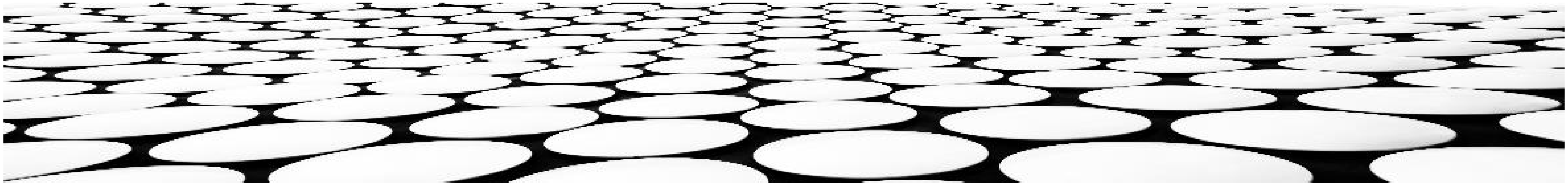
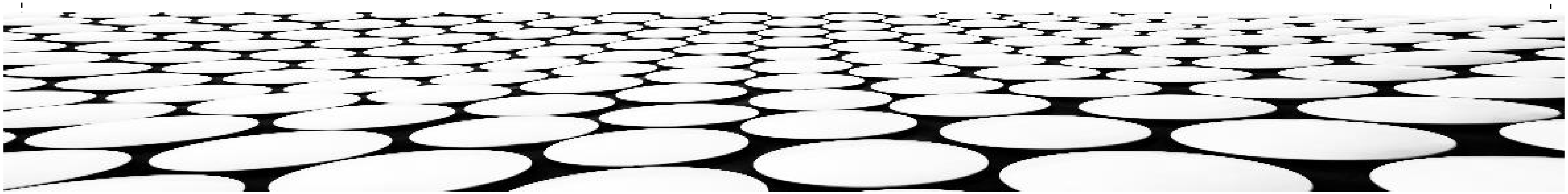
PIANC Asian Seminar 2021 (Webinar) – Coastal Disaster Prevention (Tsunami, Storm surge / High Waves)

(11 May 2021)

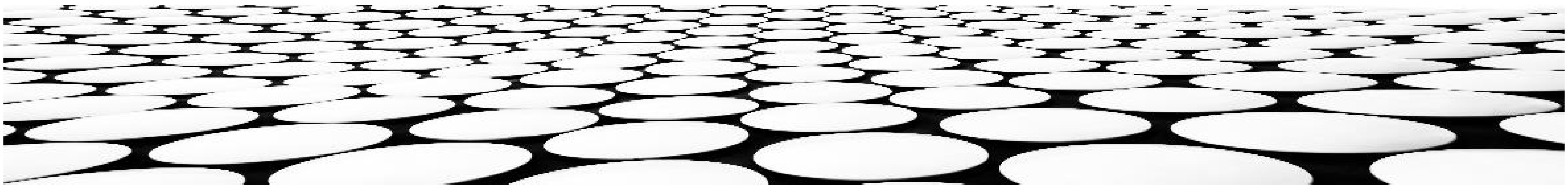


OUTLINE

1. Disaster in Indonesia and Tsunami Events
2. Post Tsunami Survey and Lesson Learnt
3. Risk Disaster Management Policy in Indonesia



1. DISASTER IN INDONESIA AND TSUNAMI EVENTS



Natural Disaster in Indonesia

- Indonesia is suffered several Natural Disasters experiences include Tsunami.
- Indonesia is in the Rings of Fire, high potential earthquakes, volcanos eruptions, Tsunami and Storm surge, Flood, Land Slides, droughts and etc.
- Tsunami disaster history in Indonesia

Indonesia in Rings of Fire

Ring of Fire for short, is an area where a large number of earthquakes and volcanic eruptions occur in the basin of the Pacific Ocean.

The Pacific Ring of Fire is home to 452 volcanoes in total - that's 75 percent of the world's active and dormant volcanoes.

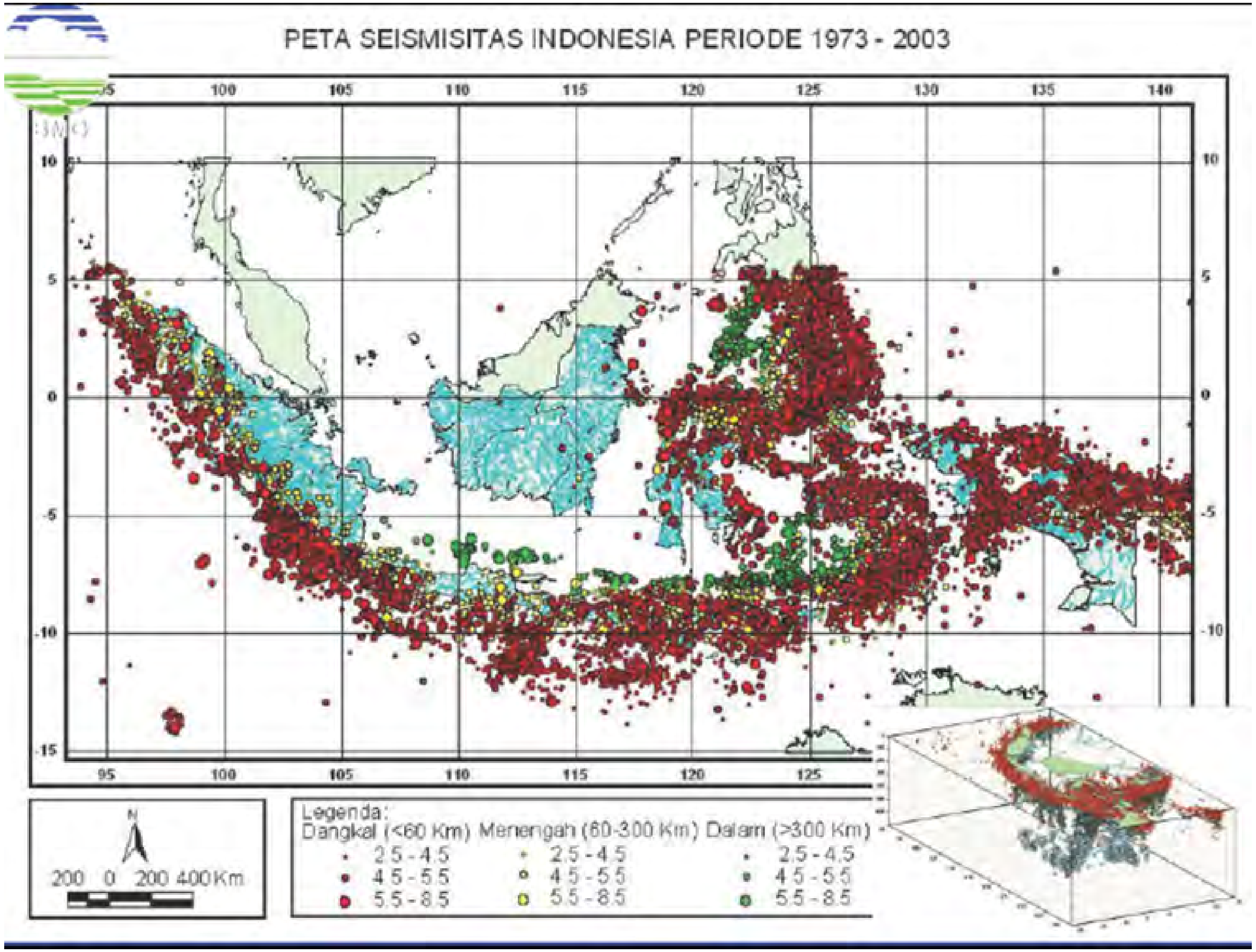
Both of Indonesia's most active volcanoes – **Kelud** and Mount **Merapi** (meaning "mountain of fire") – sit on Java Island.

Other colossal volcanic eruptions that have occurred in Indonesia include the eruption of **Krakatau**, which reportedly generated the loudest sound ever heard in modern history. Krakatau is a volcanic island located between the islands of Java and Sumatra.

The **Toba** supervolcano located on the island of Sumatra, which erupted 70,000 years ago, was a global catastrophe, creating six years of volcanic winter.

http://mapcardshunting.blogspot.com

Seismic - Tectonic in Indonesia



Tectonic earthquakes will occur anywhere within the earth where there is sufficient stored elastic strain energy to drive fracture propagation along a fault plane.

Most boundaries do have such asperities and this leads to a form of stick-slip behaviour. Once the boundary has locked, continued relative motion between the plates leads to increasing stress and therefore, stored strain energy in the volume around the fault surface. This continues until the stress has risen sufficiently to break through the asperity, suddenly allowing sliding over the locked portion of the fault, releasing the stored energy. This energy is released as a combination of radiated elastic strain seismic waves, frictional heating of the fault surface, and cracking of the rock, thus causing an earthquake.

SUBDACTION BOUNDARIES

These occur where either oceanic lithosphere subducts beneath oceanic lithosphere (ocean-ocean convergence), or where oceanic lithosphere subducts beneath continental lithosphere (ocean-continent convergence). Where the two plates meet, an oceanic trench is formed on the seafloor, and this trench marks the plate boundary. When two plates of oceanic lithosphere run into one another the subducting plate is pushed to depths where it causes melting to occur. These melts (magmas) rise to the surface to produce chains of islands known as island arcs.

A good example of an island arc is the Western part of Sumatera and Southern part of Java Island. When a plate made of oceanic lithosphere runs into a plate with continental lithosphere, the plate with oceanic lithosphere subducts because it has a higher density than continental lithosphere. Again, the subducted lithosphere is pushed to depths where magmas are generated, and these magmas rise to the surface to produce, in this case, a volcanic arc, on the continental margin.

http://ratihfitriaputri.blogspot.com/2010/04/tectonic-earthquake-and-subdaction.html

Tsunami Disaster History in Indonesia

- Before 2004 Indian Ocean Tsunami
- 2004 Indian Ocean Tsunami
- 2006 South Java Tsunami
- 2010 Mentawai Island Tsunami
- 2018 Sulawesi Tsunami
- 2018 Sunda Strait Tsunami

Participate in Post Tsunami Survey

Before 2004 Indian Ocean Tsunami

- 1883 Krakatoa Tsunami (27 August 1883 explosion of Krakatau Volcano)
- 1992 Flores Tsunami (occurred on December 12, 1992)

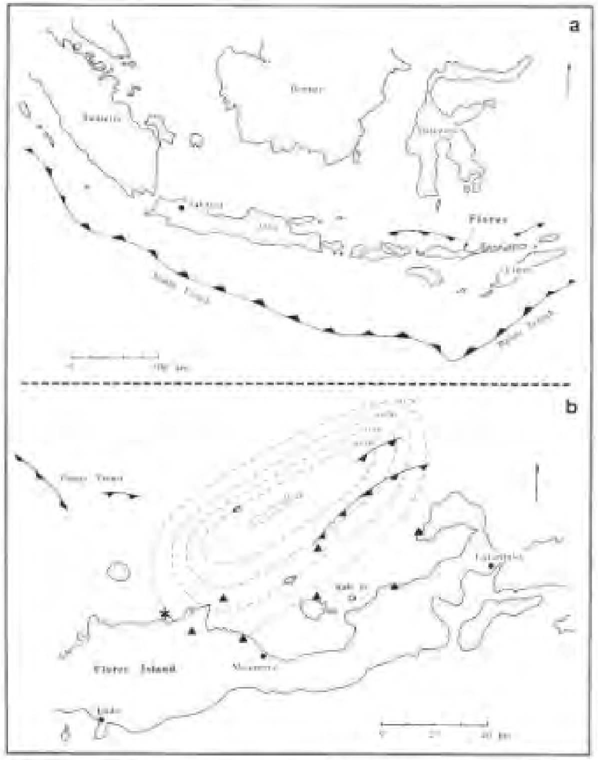
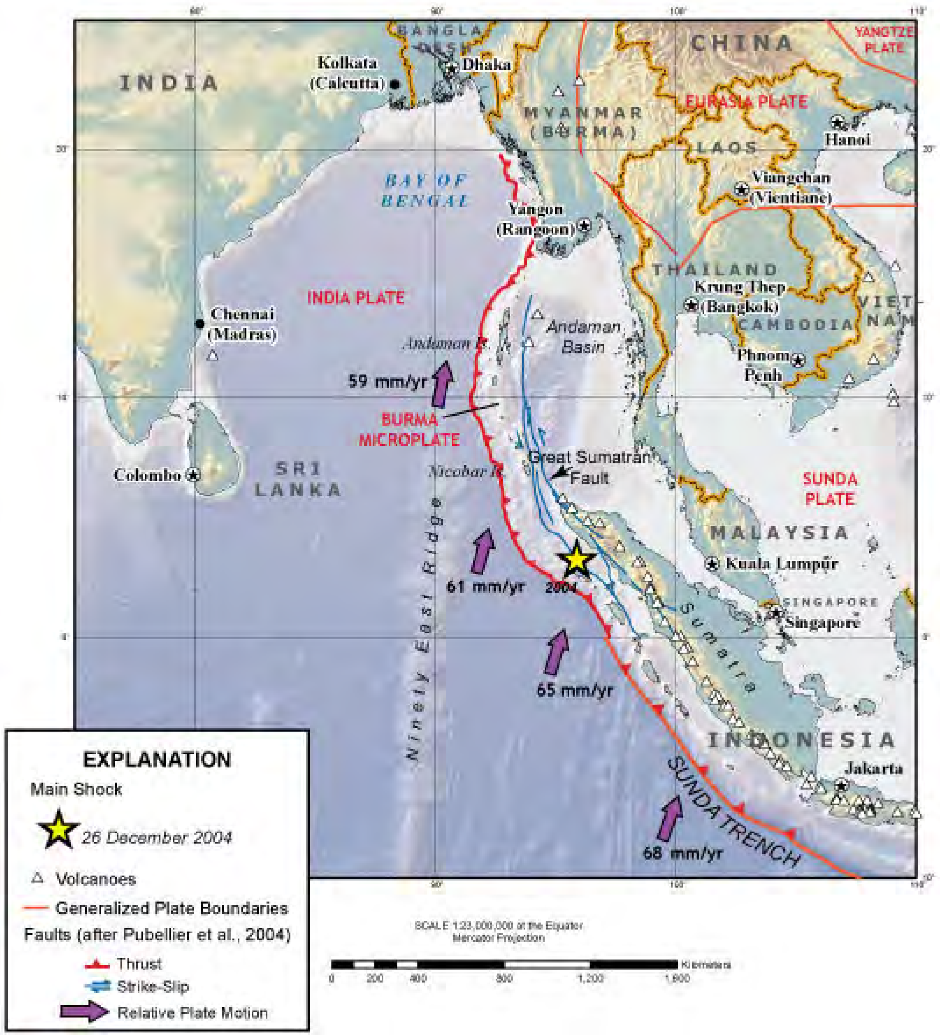


Fig. 2. Maps of (a) the Indonesian region and (b) Flores Island. Only the Sunda Trench and Banda Trenches are shown. An asterisk shows the epicenter of the mainshock, aftershock locations are indicated by a ▲, the predicted vertical seafloor displacement in meters is indicated by dashed contour lines (this displacement is directly translated to the initial tsunami condition).

Harry yeh et.al. (1993), AGU Vol 74 No 33

2004 Indian Ocean Tsunami (

- The biggest Tsunami in modern history in the world
- on Sunday morning, Dec. 26, 2004. The magnitude 9.1 quake ruptured a 900-mile stretch of fault line where the Indian and Australian tectonic plates meet off the northwest coast of Sumatra



https://www.worldvision.org/disaster-relief-news-stories/2004-indian-ocean-earthquake-tsunami-facts

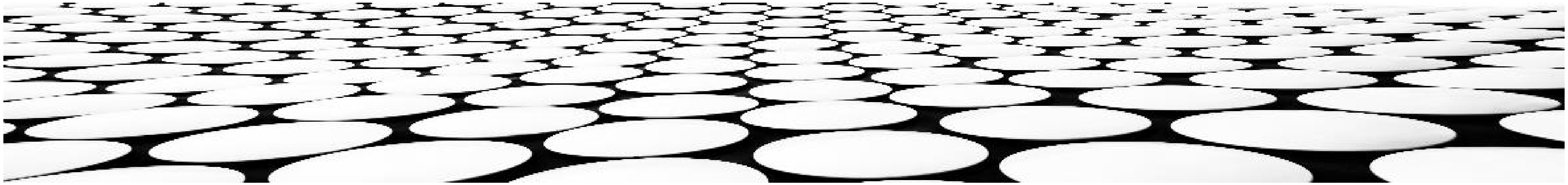
2004 Indian Ocean Tsunami (2)

- The biggest Tsunami in modern history in the world
- on Sunday morning, Dec. 26, 2004. The magnitude 9.1 quake ruptured a 900-mile stretch of fault line where the Indian and Australian tectonic plates meet off the northwest coast of Sumatra
- killing more than 100,000 people and pounding the city into rubble. Then, in succession, tsunami waves rolled over coastlines in Thailand, India, and Sri Lanka, killing tens of thousands more.
- In the total, nearly 230,000 people died in the 2004 Indian Ocean earthquake and tsunami
- Since the 2004 tsunami, governments and aid groups have prioritized disaster risk reduction and preparedness.

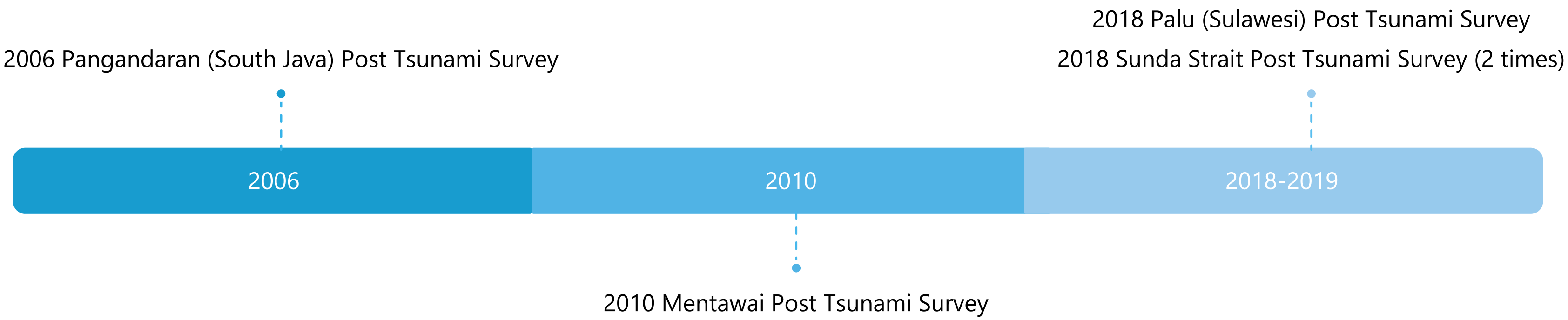
https://www.earthmagazine.org/article/benchmarks-december-26-2004-indian-ocean-tsunami-strikes

2. POST TSUNAMI SURVEY AND LESSON LEARNT

[2]

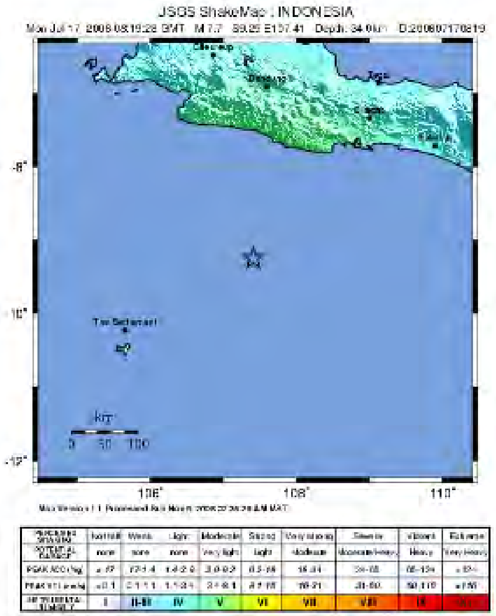


Timeline, Participate in Post Tsunami Survey (Lead by Prof. Shibayama)



2006 Pangandaran Tsunami

- occurred on July 17 at 15:19:27 local time along a subduction zone off the coast of west and central Java
- The shock had a moment magnitude of 7.7 and a maximum perceived intensity of IV (Light) in Jakarta, the capital and largest city of Indonesia.



http://www.eqh.dpri.kyoto-u.ac.jp/~mori/java/tsunami-damage.pdf

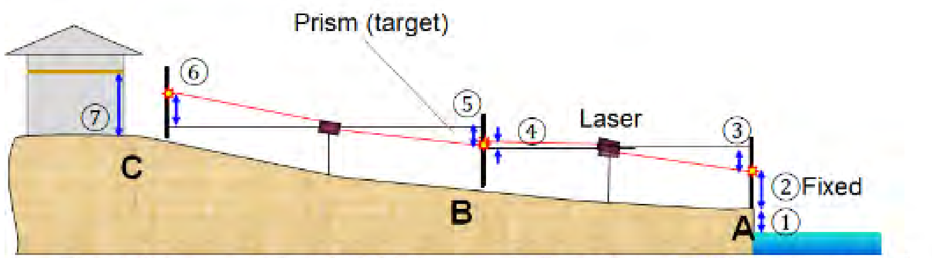
2006 Pangandaran Post Tsunami Survey & Lesson Learnt (1)

- The survey was carried out on July 21-24, 2006.
- Team Member: Prof. Tomoya Shibayama (Leader), Prof. Jun Sasaki, Dr. Hiroshi Takagi (YNU team), Hendra Achiari, Dr. Andojo Wurjanto, Dr. Rildova (ITB team),

2006 Pangandaran Post Tsunami Survey & Lesson Learnt (2)

Survey location and The Results:

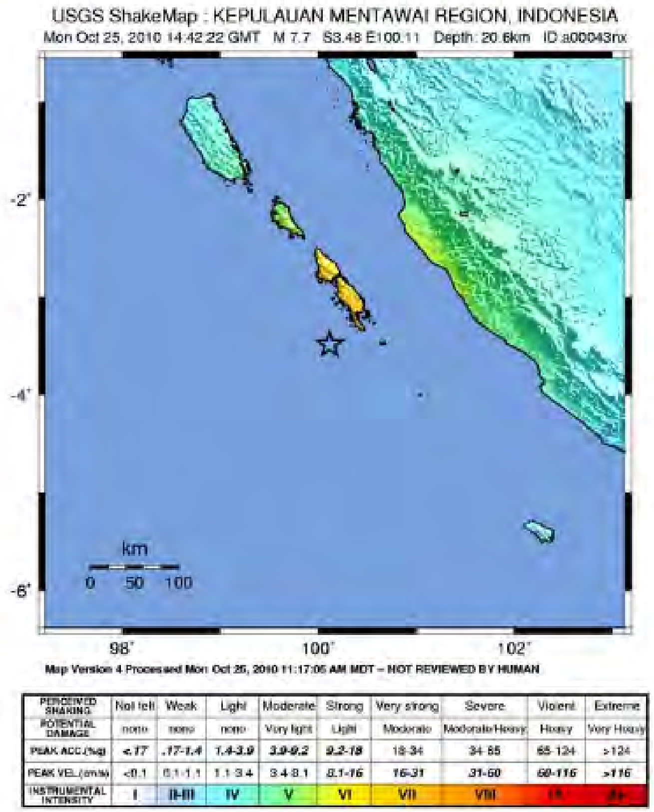
- West Coast of Pangandaran: Some residential area was completely swept away. Water level seemed to be less than 1.0m. The devastated damaged were possibly caused by flood with high speed.
- East Coast of Pangandaran : We recognized a water mark on the external wall of a house. Thus, the runup height was measured. A water mark, 3.65 m from sea level at the time.
- Widarapayung Wetan: 4.68 m from sea level
- Cipatujah : This location just behind the sea, Tsunami surged from Upland to low land (under tow),
- **Lesson learnt** : We recognized important consideration about: (i) Landscape such as small island and tomobolo, etc. (ii) Population density, Land Use, Local Topography etc. (iii) Natural Barriers such as Sand Dunes and Coral Reefs etc. (iv) Evacuation of Residents and Tourists



The difference of prism heights is equal to the difference of the ground levels.

2010 Mentawai Tsunami

- The 2010 Mentawai earthquake occurred with a moment magnitude of 7.8 on 25 October off the western coast of Sumatra at 21:42 local time
- The earthquake occurred on the same fault that produced the 2004 Indian Ocean earthquake.
- It was widely felt across the provinces of Bengkulu and West Sumatra and resulted in a substantial localized tsunami that struck the Mentawai Islands.
- The tsunami caused widespread destruction that displaced more than 20,000 people and affected about 4,000 households. 435 people were reported to have been killed, with over 100 more still missing.
- The subsequent relief effort was hampered by bad weather and the remoteness of the islands, which led to delays in the reporting of casualties.

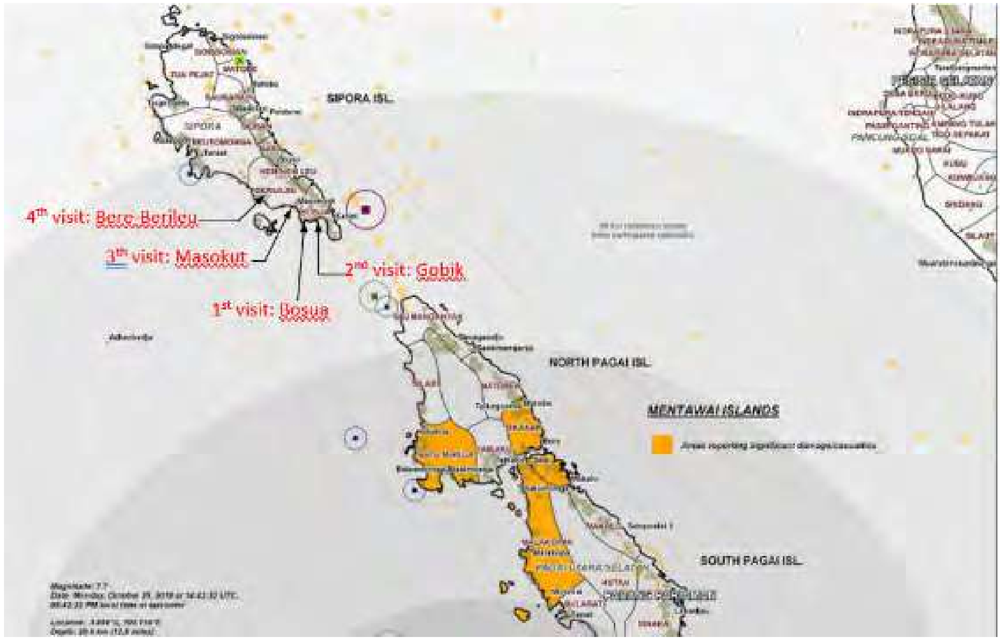


https://www.usgs.gov/

2010 Mentawai Post Tsunami Survey & Lesson Learnt (1)

Team member, Survey location and The Results:

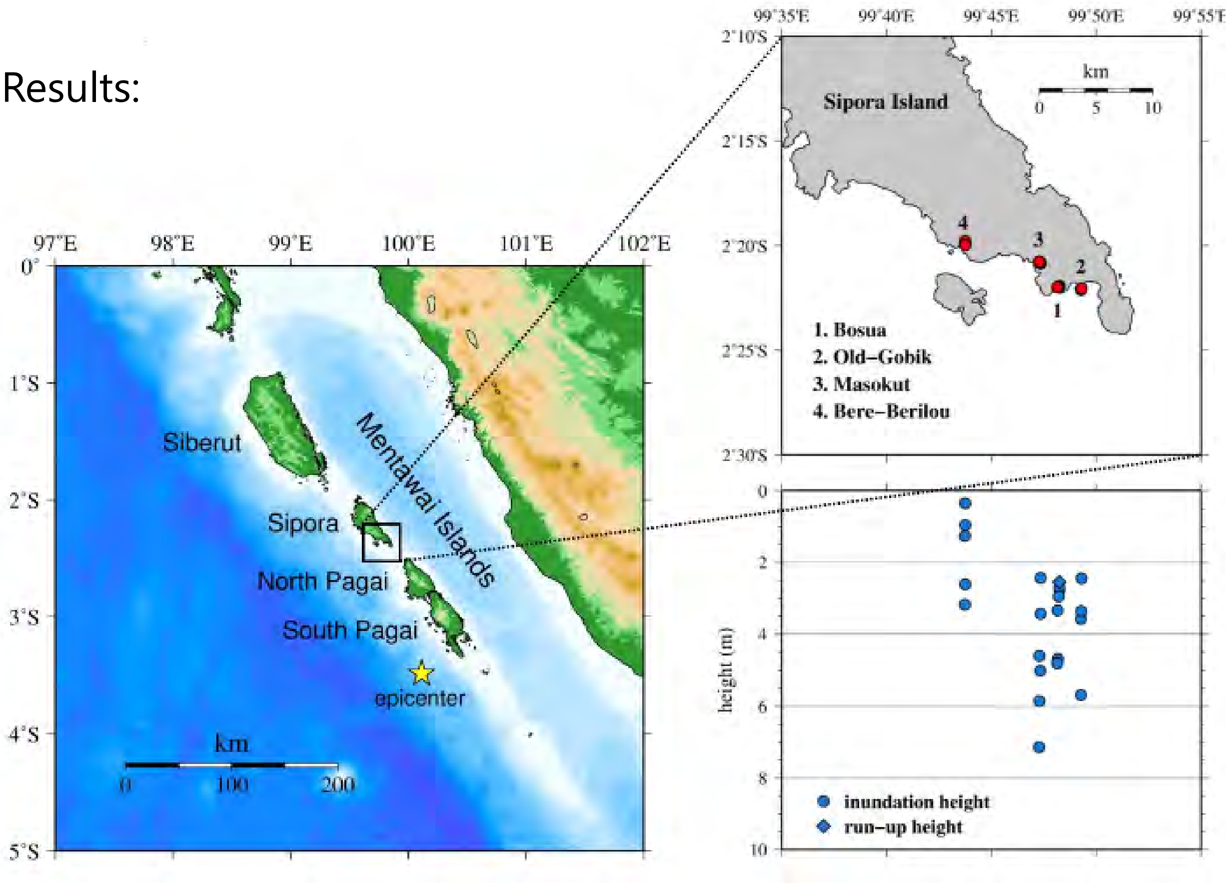
- Prof. Tomoya Shibayama (Leader), Dr. Miguel Esteban, Mr. Koichiro Ohira, Mr. Takahito Mikami (Waseda University), Prof. Jun Sasaki , Dr. Takayuki Suzuki (Yokohama National University-Japan), Dr. Hendra Achiari, Mr. Teguh Widodo (Bandung Institut of Technology- Indonesia)
- Survey ware caried out on November 18-19, 2010.
- Location visited : (1) Bosua, (2) Gobik, (3) Masokout, (4) Bere-Bereleu
- **Results**: Some visual measurement and observation were obtained.
- **Lesson learnt**: (1) We observed that this area remoteness of the islands, it makes difficult for rescue and the rehabilitation, (2) The disaster drill simulation is need to reduced the causalities (3) The building material quality is needed to improve and (4) the green belt has proved to reduced the tsunami run up.



4 Locations in Sepora Island were visited during Post Tsunami Survey

2010 Mentawai Post Tsunami Survey & Lesson Learnt (2)

The Measurement Results:



Inundation height & Runup height after 2010 Mentawai Post Tsunami Survey

2010 Mentawai Post Tsunami Survey & Lesson Learnt (3)

Visual observation :

1. "Bosua Village"

Fig 1. The Damage village, distance 50-150m from coast line, type of house: wood semi-permanent.

Fig 2. A safe house, distance 150m from coast line, type of house: semi-permanent, water flood elevation: 35 cm from floor ground level.

Fig 3. The damage house, distance 50-150m from coast line, type of house: brick semi-permanent. At upper side shows the safe house.

Fig 4. The detail of the brick on the damage house, distance 100m from coast line, type of house: brick semi-permanent. Upper left shows a concrete beam after collapsed, the size of cross-section: 15cmx15cm

2. "Old-Gobik Village"

Fig 5. The condition of road transportation, the distance 50-100m from coast line, at lower right side shows some steel pipes for fresh water supply looks bending after tsunami attack

Fig 6. The damage village, distance 50-100m from coast line, type of house: brick permanent.

Fig 7. The detail of brick on a destroyed house, distance 50m from coast line, It was a brick with the thickness: 10 cm on the a concrete stone foundation, with composition: stone+ cement + beach sand (yellow colored), the column was using steel bar 4x@10 mm

Fig 8. A non damage house, distance 70m from coast line, type of house: brick-permanent, it indicated as not attacked by the tsunami, the possible reason: concave geometric of the beach and high density of marsh tree at the front of this house.

2010 Mentawai Post Tsunami Survey & Lesson Learnt (4)

Visual observation :

3. "Masokut Village"

Fig 9. The situation of a damage village, distance 50-150m from coast line, at back side shows a tent for the refugees. Rigth side shows the wood of column-beam of a house after it shift/transported to 10-20cm from its original position on its previous the foundation.

Fig 10. The damage house, distance 150m from coast line, type of house: brick permanent, the highest water level at 254 cm from ground level.

Fig 11. The detail of a destroyed house, distance 150m from coast line, type of house: brick semi-permanent, half made by cement and upper structure made by wood.

Fig 12. A safe house just 60 m from coast line, only the foundation was eroded. Type of house: brick-permanent, it is indicated as not attacked by the tsunami, the possible reason: high local ground level and high density of mangrove tree at the front of this house.

4. "Bere-Berilou Village"

Fig 13. The situation of a damage building, distance 110m from coast line, Most of wall is destroyed, the tsunami attacked come from left side of the building.

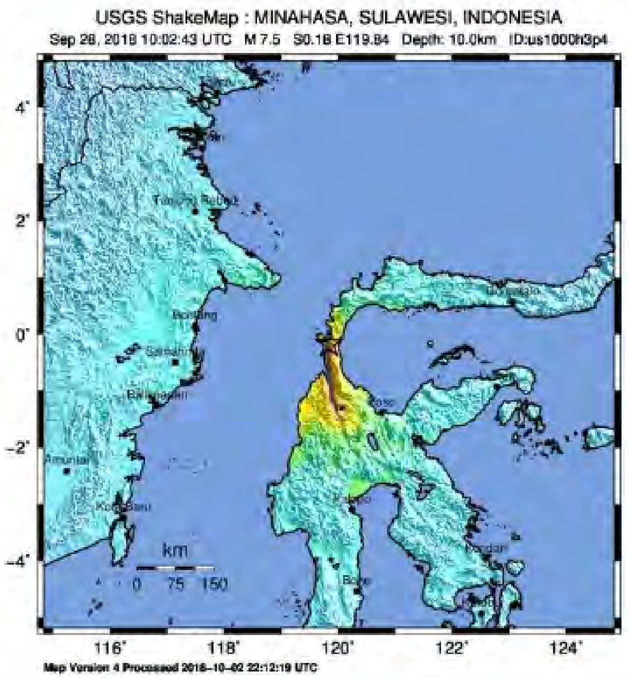
Fig 14. The detail of a damage building, the column size is 16x16 cm. The bending occurred on 1/3 of the column, It is indicated as the highest stress on the structure of beam.

Fig 15. The situation of a destroyed house, distance 120m from coast line, type of house: brick permanent, the hole on the wall is indicated as a strong power of tsunami direction attacked.

Fig 16. Some of the safe houses, the distance: 150m-300 from coast line, The lived people said the tsunami came until 3 times after earthquake, the 3rd was the strongest current. It inundated until the end of road of this photo.

2018 Sulawesi (Palu) Tsunami

- On 28 September 2018, a shallow, large earthquake struck in the neck of the Minahasa Peninsula, Indonesia, with its epicentre located in the mountainous Donggala Regency, Central Sulawesi.
- The magnitude 7.5 quake was located 70 km (43 mi) away from the provincial capital Palu. This event was preceded by a sequence of foreshocks, the largest of which was a magnitude 6.1 tremor that occurred earlier that day.
- Following the mainshock, a tsunami alert was issued for the nearby Makassar Strait. A localised tsunami struck Palu, sweeping shore-lying houses and buildings on its way. The combined effects of the earthquake and tsunami led to the deaths of an estimated 4,340 people. This makes it the deadliest earthquake to strike the country since the 2006 Yogyakarta earthquake, as well as the deadliest earthquake worldwide in 2018, surpassing the previous earthquake that struck Lombok a few months earlier, killing more than 500. The subsequent relief effort was hampered by bad weather and the remoteness of the islands, which led to delays in the reporting of casualties.
- The earthquake caused major soil liquefaction in areas in and around Palu. In two locations this led to mudflows in which many buildings became submerged causing hundreds of deaths with many more missing. The liquefaction was considered to be the largest in the world and was deemed as rare.



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2012)

https://www.usgs.gov/

2018 Sulawesi Post Tsunami Survey & Lesson Learnt (1)

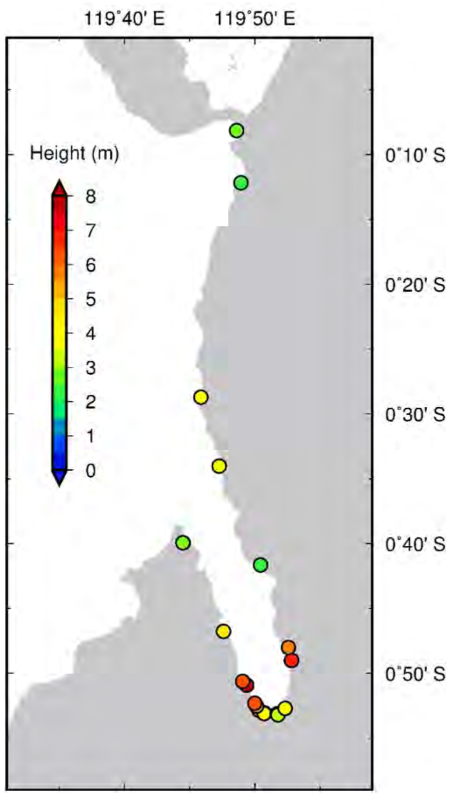
Team member, Survey location and The Results:

- Prof. Tomoya Shibayama (Leader), Prof. Miguel Esteban, Dr. Tomoyuki Takabatake, Mr. Yuta Nishida (Waseda University-Japan), Dr. Takahito Mikami (Tokyo City University), Dr. Ryota Nakamura (Toyohashi University of Technology, Dr. Hendra Achiari, Mr. Muhamad Fadel Hidayat Marzuki (Bandung Institute of Technology), Prof. Rusli, Dr. Abdul Gafur Marzuki (State Institute for Islamic Studies Palu, Indonesia), Prof. Ian Nicol Robertson (University of Hawaii, USA), Mr. Jacob Stolle (University of Ottawa, Canada), Mr. Clemens Krautwald (Technical University of Braunschweig, Germany)
- Survey ware caried out on October 27-31, 2018.
- Location visited : Along as Palu Bay coast and Surrounding Palu City.
- **Results**: 1）Survey of tsunami inundation height distribution, 2) Interviews and questionnaire survey to residents on Tsunami behavior and their evacuation, 3）Three dimensional image processing by using a drone, 4）Sonner sounding of shallow water bathymetry in Palu Bay, 5）Survey of broken structures and buildings
- **Lesson learnt**: We found that 4 mechanism of Tsunami in this location: 1) Fault Dislocation in Vertical Direction, 2)Landslide both in land and in sea floor, 3) Fault Dislocation in Horizontal Direction, 4) Sloshing inside of Palu Bay due to steep slope.

Full team members of 2018 Sulawesi Post Tsunami Survey

2018 Sulawesi Post Tsunami Survey & Lesson Learnt (2)

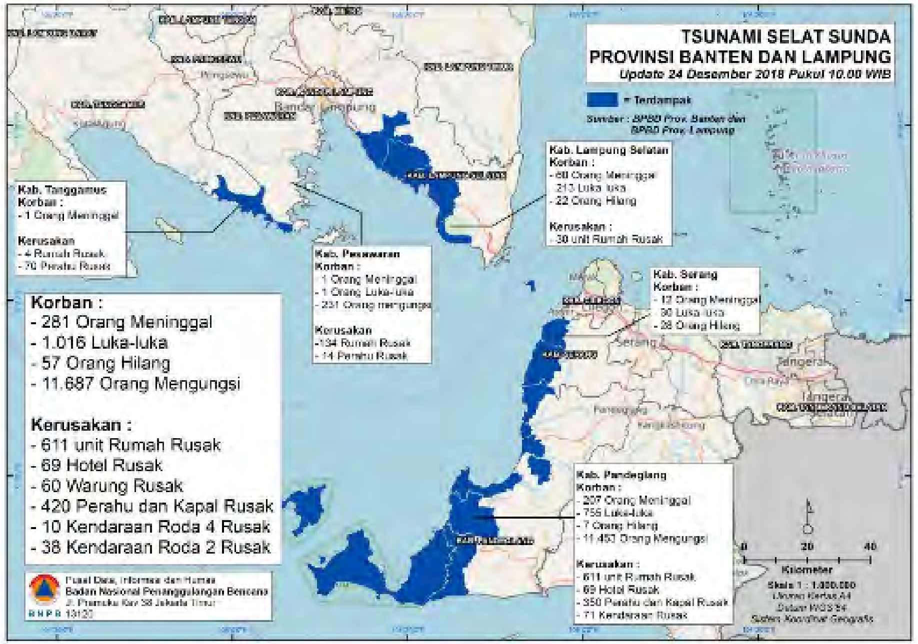
Measurement Survey Results:



Inundation and Runup height after 2018 Sulawesi Survey

2018 Sunda Strait Tsunami

- On 22 December 2018, a tsunami that followed an eruption and partial collapse of the Anak Krakatau volcano in the Sunda Strait struck several coastal regions of Banten in Java and Lampung in Sumatra, Indonesia
- At least 426 people were killed and 14,059 were injured.
- The tsunami was caused by an undersea landslide that followed an eruption of Anak Krakatau, the "Child of Krakatoa" . it was found that much of the island of Anak Krakatau had collapsed into the sea.
- In the months leading up to the 2018 tsunami, Anak Krakatau had seen increased activity, with an eruption on 21 December lasting more than two minutes and producing an ash cloud 400 metres high.
- On 22 December 2018, at 21:03 local time, Anak Krakatau erupted and damaged local seismographic equipment, though a nearby seismographic station detected continuous tremors. The eruption caused the collapse of the southwest portion of the volcano, which triggered a tsunami. Officials stated that approximately 64 hectares (160 acres) of the volcano had collapsed into the ocean. The collapse caused the height of the volcano to be reduced from 338 to 110 metres.



Affected area across the Sunda Strait.
(From Indonesian National Board for Disaster Management -BNPB)

2018 Sunda Strait Post Tsunami Survey & Lesson Learnt (1)

Team member, Survey location and The Results:

- Prof. Tomoya Shibayama (Leader), Prof. Miguel Esteban, Dr. Tomoyuki Takabatake, Mr. Yuta Nishida. Mr. Naoto Inagaki (Waseda University-Japan), Dr. Takahito Mikami (Tokyo City University), Dr. Ryota Nakamura (Toyohashi University of Technology, Dr. Hendra Achiari (Bandung Institute of Technology), Mr. Nanda Nurisman, Mr. Satriyo Panalaran, Ms. Trika B. Tarigan, Ms. Elsa R. Kencana, Mr. Muhammad Aldhiansyah, Mr. Mustarakh Gelfi, (Sumatera Institute of Technology)
- Survey ware caried out 2 times: 1) on January 12-17, 2019. 2) on Aug 15 – 18, 2019.
- Location visited : 1st visit: Along Palu Lampung coast and Banten Coast. 2nd visit: Concentrated to Anak Krakatoa Islands.
- **Results**: 1）Survey of tsunami inundation height distribution, 2) Interviews and questionnaire survey to residents on Tsunami behavior and their evacuation, 3）Three dimensional image processing by using a drone (2nd visit), 4）Sonner sounding of shallow water bathymetry surrounding Krakatoa Islands (2nd visit).
- **Lesson learnt**: 1) We found the foot-print of an undersea landslide that followed an eruption of Anak Krakatau triggered the Tsunami in this locations, 2) we observed the path trajectory of wave shoaling propagation approximately to the specific coasts in Kiluan coast and Legundi Islands with the direction seems opposite side of Krakatoa as the source of wave attack. 3) some scientific publications

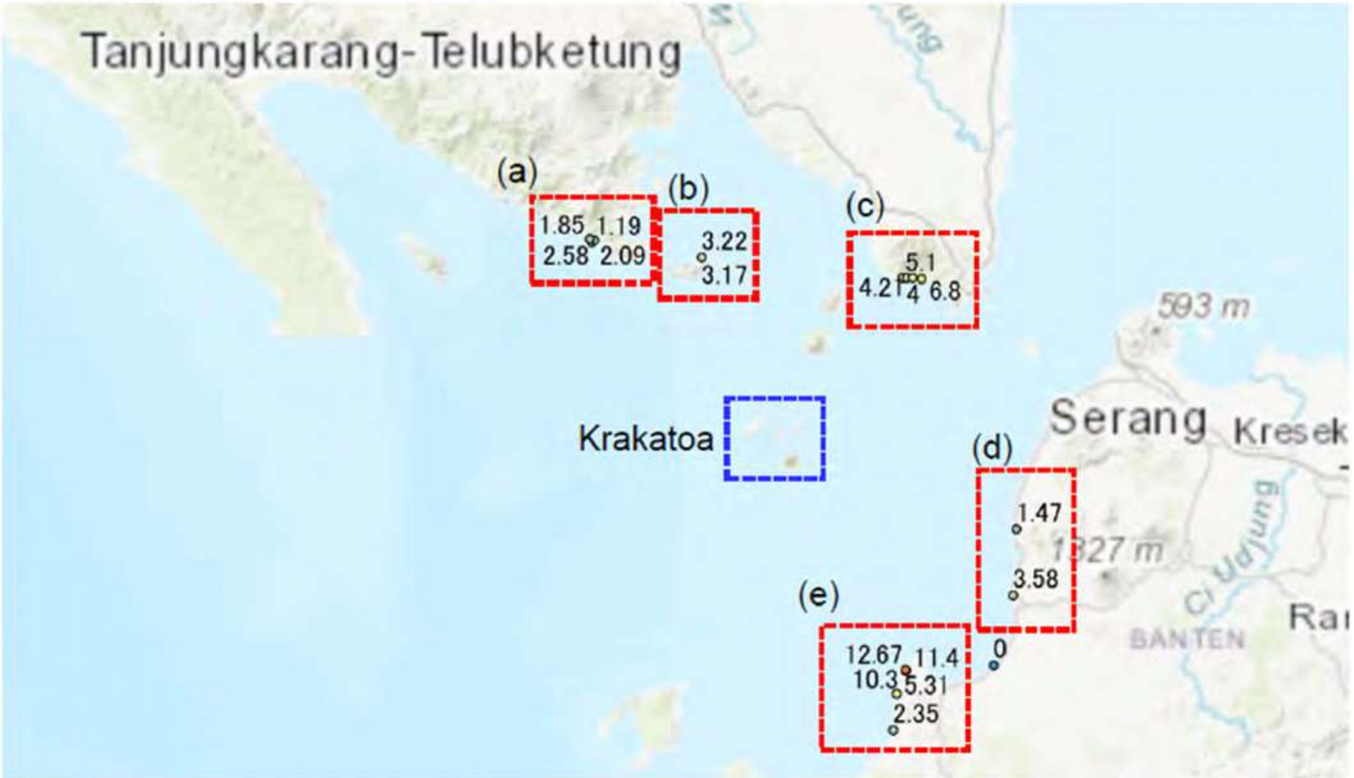
Survey Team (12-13 January 2019)

team members of 1st 2018 Sunda Strait Post Tsunami Survey

2018 Sunda Strait Post Tsunami Survey & Lesson Learnt (2)

The Measurement Results:

Measurement results



Note: The results are **not** corrected to the heights above the estimated tide level at the time of tsunami arrival.

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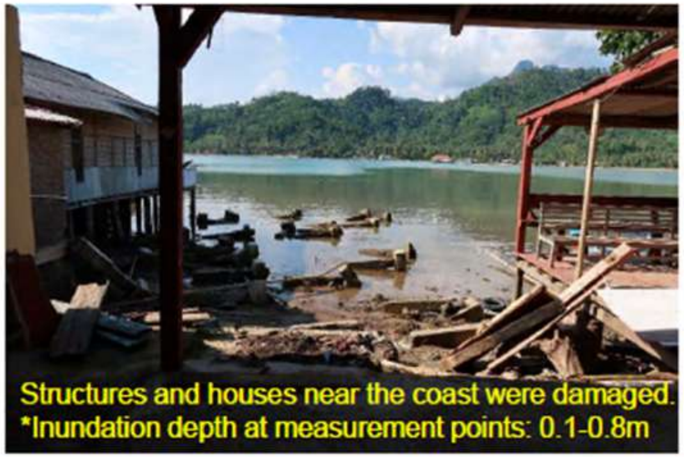
2018 Sunda Strait Post Tsunami Survey & Lesson Learnt (3)

Bandung Jaya Village / Sinar Agung Village, Kiluan

Visual Observation:



2018 Sunda Strait Post Tsunami Survey & Lesson Learnt (4)

Visual Observation:

Selesung Village, Legundi island

2018 Sunda Strait Post Tsunami Survey & Lesson Learnt (5)

Waymuli Village / Kunjiri Village / Kahai Beach, Kalianda

Visual Observation:

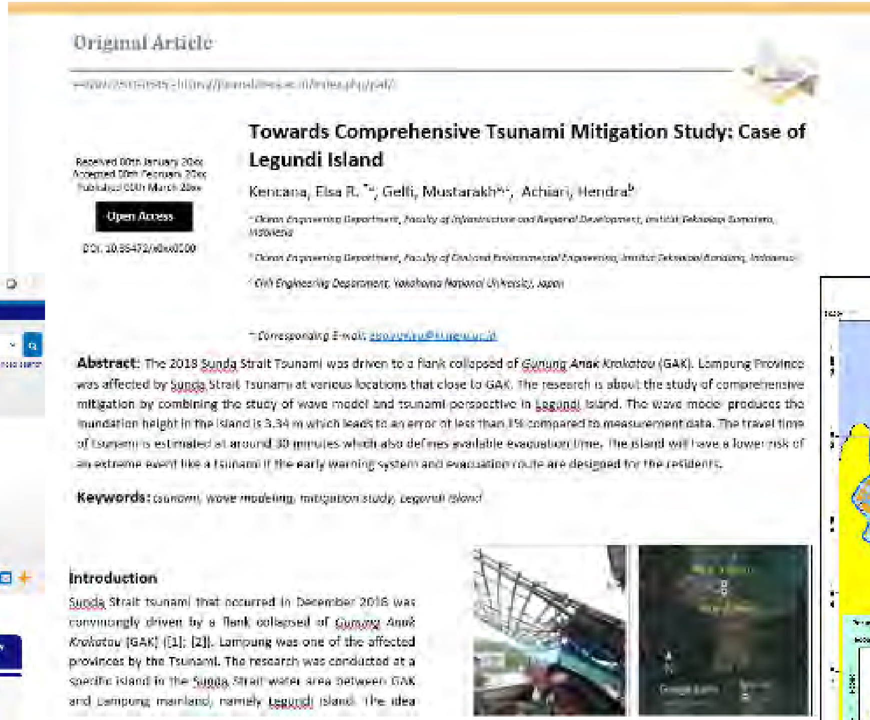
2018 Sunda Strait Post Tsunami Survey & Lesson Learnt (6)

Visual Observation
(Banten Province):

Tanjung Jaya Village / Cipenyu Village, Panimbang

2018 Sunda Strait Post Tsunami Survey & Lesson Learnt (7)

Scientific Papers



Original Article

Towards Comprehensive Tsunami Mitigation Study: Case of Legundi Island

Kencana, Elsa R. [a*], Gelli, Mustarakh[a,c], Achiari, Hendra[b]

[c] Civil Engineering Department, Yokohama National University, Japan

Open Access

Abstract: The 2018 Sunda Strait Tsunami was driven to a flank collapsed of Gunung Anak Krakatau (GAK). Lampung Province was affected by Sunda Strait Tsunami at various locations that close to GAK. The research is about the study of comprehensive mitigation by combining the study of wave model and tsunami perspective in Legundi Island. The wave model produces the inundation height in the island is 3.34 m which leads to an error of less than 3% compared to measurement data. The travel time of tsunami is estimated at around 30 minutes which also defines available evacuation time. The island will have a lower risk of an extreme event like a tsunami if the early warning system and evacuation route are designed for the residents.

Keywords: tsunami, wave modeling, mitigation study, Legundi Island

Introduction

Sunda Strait tsunami that occurred in December 2018 was convincingly driven by a flank collapsed of Gunung Anak Krakatau (GAK) ([1]; [2]). Lampung was one of the affected provinces by the Tsunami. The research was conducted at a specific island in the Sunda Strait water area between GAK and Lampung mainland, namely Legundi island. The idea

https://www.tandfonline.com/doi/full/10.1080/21664250.2019.1647963

Coastal Engineering Journal

Field survey and evacuation behaviour during the 2018 Sunda Strait tsunami

422

23

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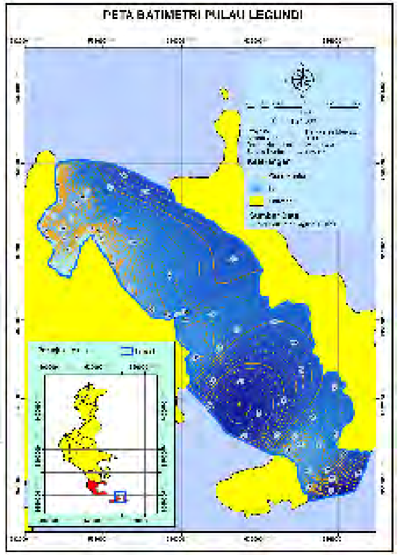
ABSTRACT

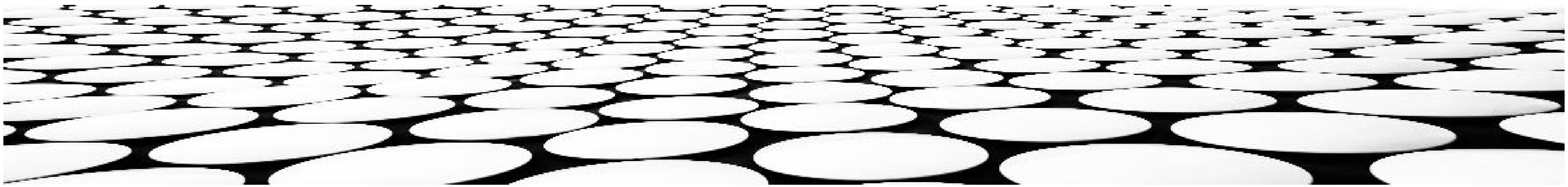
On the 22nd of December 2018, the shorelines of Sunda Strait, Indonesia, were hit by tsunami waves generated by the flank collapse of the Anak Krakatau volcano. The authors conducted a field survey of the affected areas in both Sumatra and Java islands to collect information on tsunami inundation and run-up heights, damage patterns at each coastal community, and the evacuation behaviour and tsunami awareness of the affected people. The survey results showed that in Sumatra island inundation heights of more than 4 m were measured along the coastline that was situated to the north-northeast of Anak Krakatau, while less than 4 m were measured along the north-western direction. Inundation heights of over 10 m were measured at Cipenyu Beach (Pandeglang Regency) in Java island (south-south-eastern direction from Anak Krakatau). A questionnaire survey conducted by the authors revealed residents' perception of danger and evacuation patterns during the event. The results indicate the importance of having an operational tsunami warning system in Sunda Strait and the establishment of an appropriate evacuation plan so that residents can start evacuation immediately and reach a safe place without facing severe congestion along evacuation routes.

Related research

STAR INITIATIVE



3. RISK DISASTER MANAGEMENT POLICY IN INDONESIA

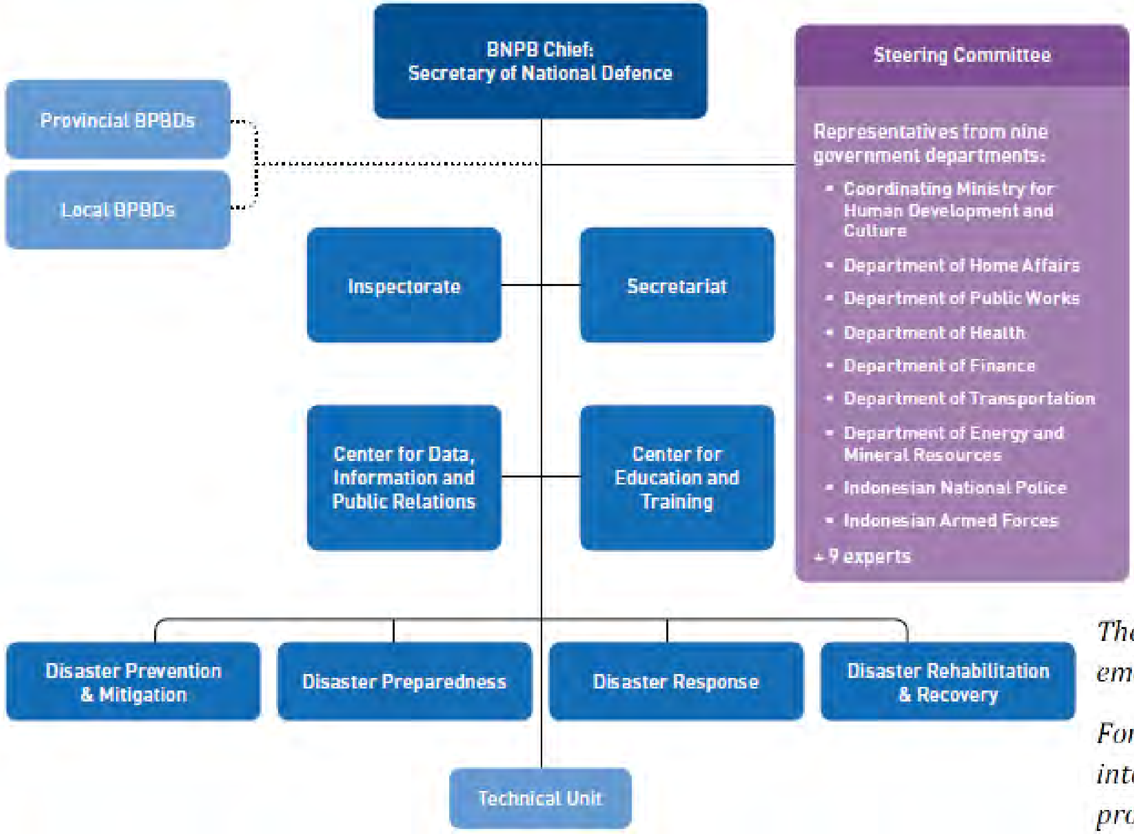


Indonesian Disaster Managemen

Sources:

- Disaster Management Reference Handbook 2018
- Annex-8-National-Agency-Presentation-by-Indonesia-BNPB-11th-ARF-ISM

Disaster Management Structure in Indonesia

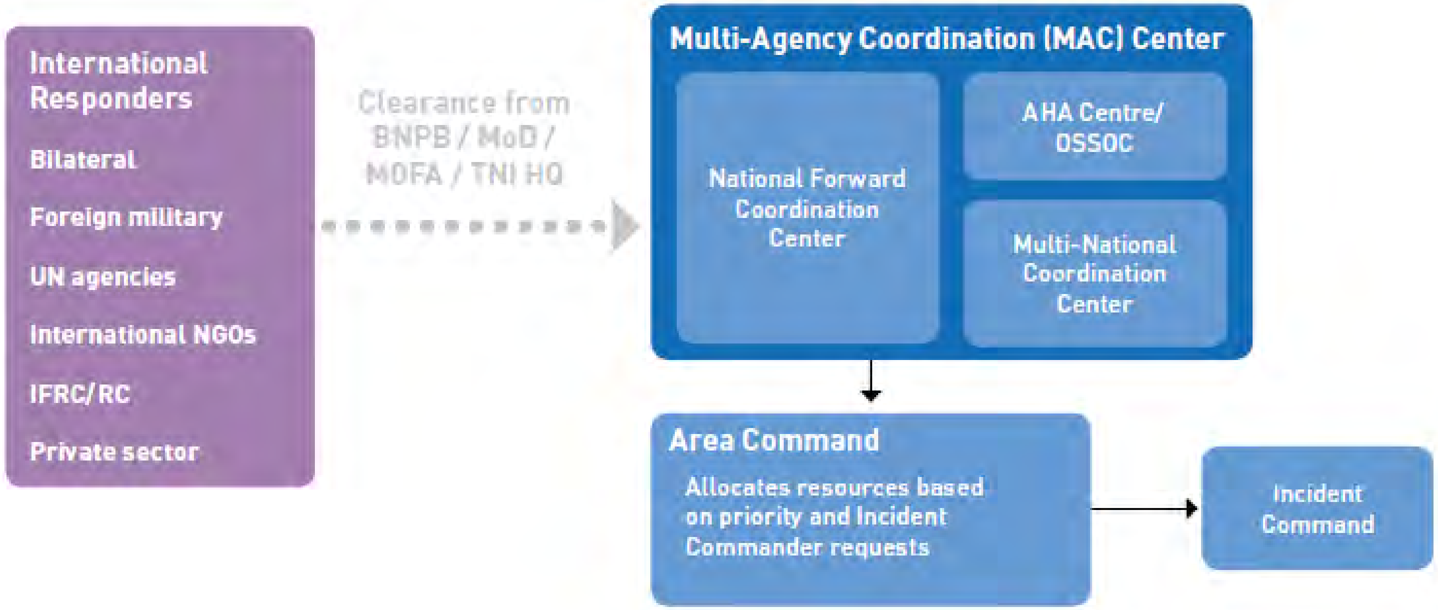


The disaster management in Indonesia is based on the government Law No. 24/2007 governing "the National System for Disaster Management has developed in Indonesia", at the national to the district levels under the coordination of National Agency for Disaster Management (BNPB).

The National Agency for Disaster Management also has the mandate in pre-disaster, emergency, post-disaster and evaluation of disaster management implementation.

For effective coordination and implementation, the disaster management is integrated into the annual, medium and long term development plan (DIPA) at the national, provincial, and district levels.

Coordination of International Humanitarian and Military Assistance



Funding

With regard to funding, there are sources of funding especially identified to support the Disaster Risk Reduction and Relief, namely:

1. *Annual funding that especially allocated to support ministries/departments' routine and operational activities especially for Disaster Risk Reduction and Relief projects and activities;*
2. *Contingency funding- allocated budget for any emergency preparedness;*
3. *On-call funding- allocated for emergency response;*
4. *Social assistance funding- provided for post-disaster assistance;*
5. *Other than that, there is funding voluntarily contributed by community which is independently organized by community.*

Infrastructure and Support

Infrastructure condition:

- Airport
- Sea port
- Land Routes
- Schools
- Communication
- Utilities

In dealing with disasters preparedness also include infrastructure development. For that purpose, Indonesia establishes emergency operation centers, logistic and equipment depots.

There are 12 locations set to be established as regional logistic depots throughout Indonesia. Those depots are going to be located in Medan and Palembang (Sumatra Island), Jakarta and Surabaya (Java), Pontianak and Samarinda (Kalimantan/Borneo), Manado and Makassar (Sulawesi), Mataram and Kupang (Nusa Tenggara), Ambon (Maluku), and Jayapura (Papua).

Indonesia enhances its national capacity to cope with disaster by setting up Early Warning System, Disaster Information Database (DiBi) and Standard in Risk Assessment (PARBA).

Health-care, Rapid Disaster Response & Assistance

In the aftermath of a disaster it is crucial to put in place a rapid response and assistance delivery system.

Stand-by force for emergency management or Indonesian Rapid Response and Assistance (INDRRA) is a combined civil-military forces from various relevant line ministries/agencies.

This force is stand-by ready to assist the disaster-affected local government in undertaking emergency activities in its area in a timely and integrated manner.

There are two units to cover the western and eastern part of Indonesia; the units are based in the Air Force Base, in Jakarta, to cover Western Part of the country and Malang, East Java to cover the eastern part.

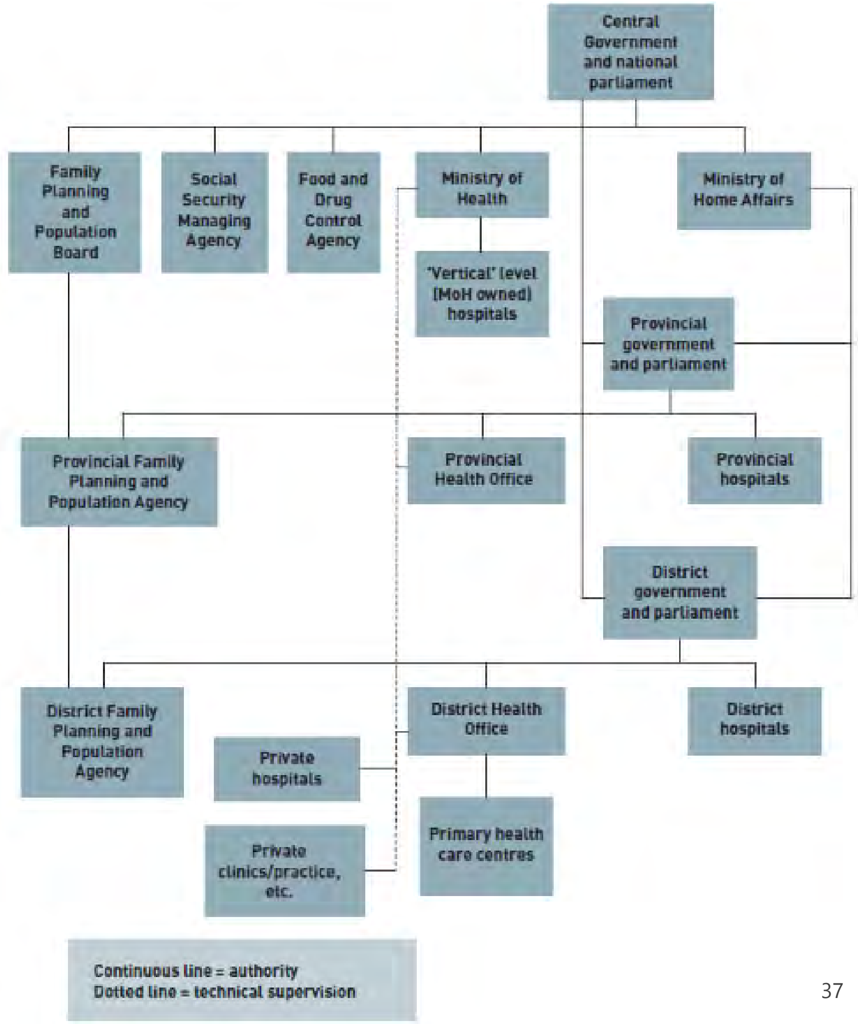
Both units were established in December 2009. They are fully equipped, self-sufficient and are receiving various trainings and knowledge to handle emergency situation.

Currently there are 550 personnel at the core of the stand-by force and another additional 3,000 personnel to support this force's operations.

The decision to deploy Indonesian Rapid Response and Assistance (INDRRA) when a disaster with high impact occurs is under the Head of National Agency's call.

The Head of the Agency will issue command or an instruction letter and 75 personnel on shift will be the first batch to be deployed in the affected area.

INDRRA will be dispatched with required early support and to undertake coordination with local government. In delivering its tasks, INDRRA will optimally utilize local available resources.



Capacity building

To enhance capacity building and dissemination of information, the national education authorities is currently in the process of incorporating Disaster Risk Reduction and Relief knowledge into school curriculum.

There are ongoing projects implemented with supports from community as well as NGOs in conducting training and exercises and simulations.

Capacity building as Mitigation Part of Disaster Management Part Cycle

The Chain of Command

With regard to the chain of command, the role of the National Agency for Disaster Relief comprises of all three disaster phases.

*At the **pre-disaster phase**, the Agency is responsible for dealing with disaster risk reduction, mitigation, and preparedness plan.*

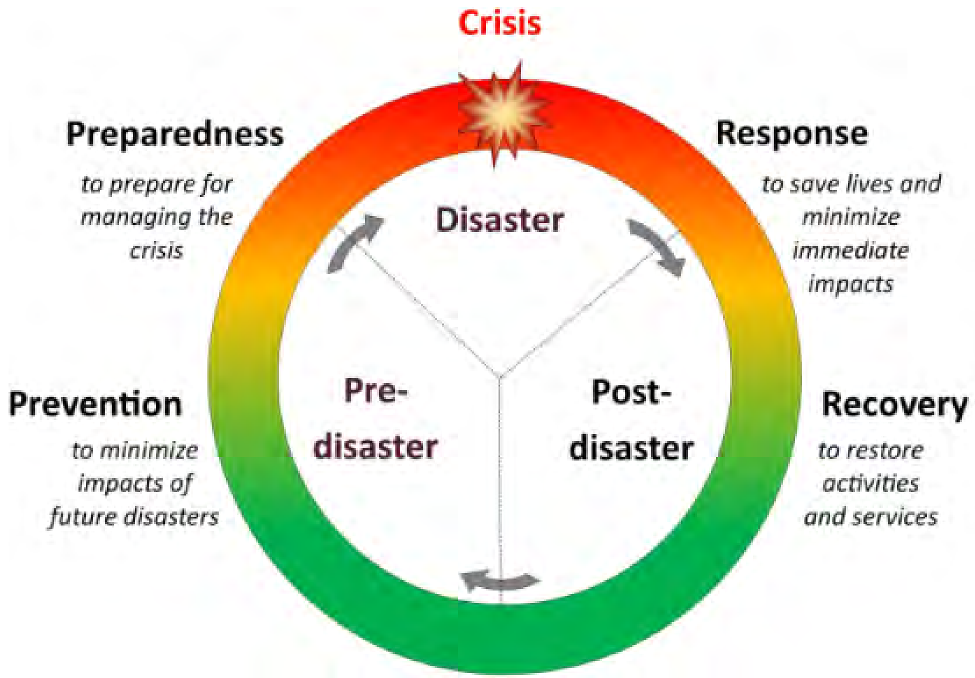
***During disaster**, the Agency is at the forefront command of conducting emergency response;*

*and at the **post-disaster phase**, recovery, rehabilitation and reconstruction process are under coordination of the Agency as well.*

When a disaster strikes, a chain of command starts from the Head of National Agency and Local Agency who should coordinate other institutions and agencies related to disaster management system to dispatch and mobilize human resources, equipments, and logistic needed to the disaster affected area.

At this phase, the mobilization will be directed towards rescue and evacuation processes, basic needs fulfillment, and emergency recovery.

In emergency situation, the Head of National Agency will give recommendation for foreign logistic and equipment assistance to be facilitated with custom duty, tax, and quarantine exemption, except for equipment and logistics with potential hazard with coordination with other related Ministries.



Disaster Management Policy in Indonesia

Key issues and Concerns

- Indonesia is highly vulnerable to natural disasters. Natural disasters disrupt the economy and often result in loss of life and livelihoods for many lower income families.
- Significant natural disasters which frequently occur in Indonesia include; earthquakes, tsunamis, volcanic eruptions, flooding, and droughts:
- The most devastating disaster to date was the 2004 Indian Ocean Earthquake and 'Tsunami which claimed over 160,000 lives in Indonesia alone. Natural disasters with the largest socio-economic impacts include; flooding, landslides, volcanoes, earthquakes and droughts.
- Disaster Management Agency (BNPB) is the primary agency responsible for developing and providing disaster management and preparedness and disaster response.
- Participation of International Institutions and Foreign Non-Governmental Organizations in Disaster Management, Disaster Management Strategic Policy (2015-2019), National Disaster 'Management Plan (2010-2014), and the BNPB Guideline Number 22 of 2010 on the Role of the International Organizations and Foreign Non-Government Organizations during Emergency Response.
- Healthcare in Indonesia is a national priority and is outlined in the Ministry of Health National Strategic Plan. Over the past two decades Indonesia has made advancements in health infrastructure. However, with regard to financial protection and impartiality in healthcare funding, Indonesia continues to face challenges.