Risk Assessment in National Priority Tourism Area

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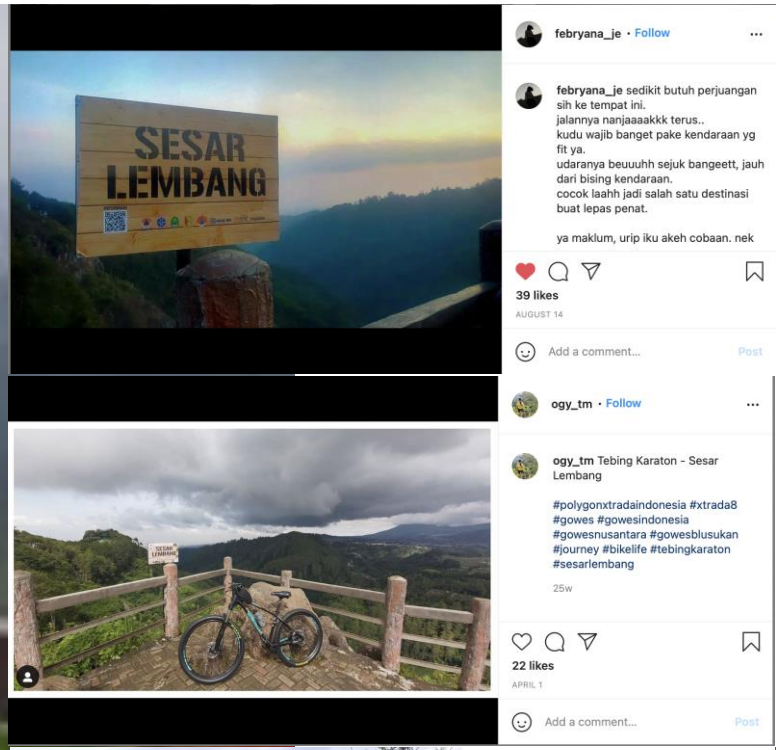
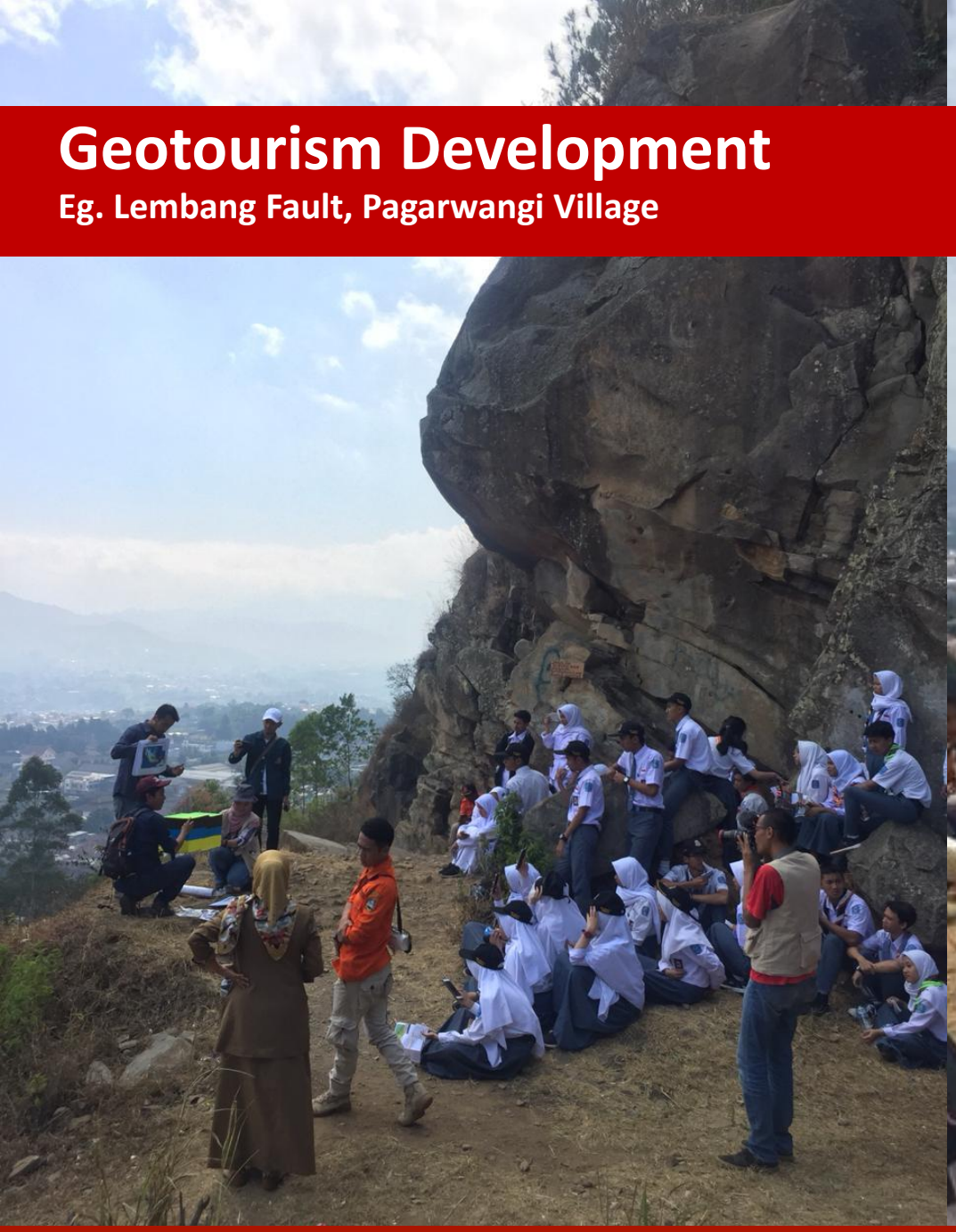
Geotourism for Education in Disaster Risk Reduction
–Information board at Lembang Fault in Tebing Keraton, Bandung



Example of Information Board on Active Fault for Geotourism
– Location @ Gunung Putri, Lembang

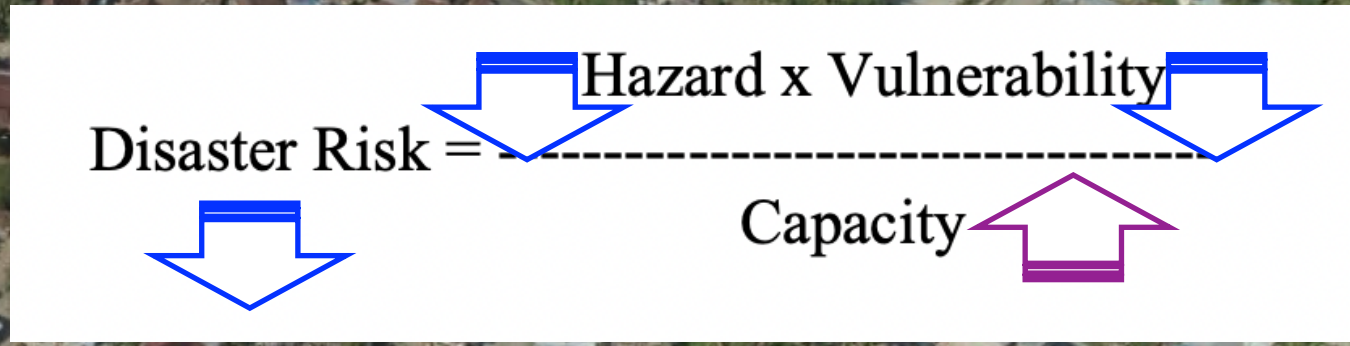
Geotourism Development

Eg. Lembang Fault, Pagarwangi Village



All disasters are fundamentally human made, a function of where and how people choose or are forced to live (Redmond, 2005)

The trigger may be a natural phenomenon such as an earthquake, but its impact is governed by the prior vulnerability of the affected community



Hazard assessment: determines the likelihood of experiencing any **natural or human-made hazard or threat** in the community. Assessment includes the nature and behavior of each of the hazards the community is exposed to.

Vulnerability assessment: identifies what **elements** are at risk and why they are at risk

Capacities assessment: identifies the **people's** coping **strategies**; resources available for **preparedness, mitigation** and emergency response; who has access to and control over these resources.

People's perception of risk: identifies the **perception of risks** of the heterogeneous groups and sectors, which make up the community; measurement of the community's disaster risks based on people's perception.

Earthquake

A term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth.

Faults are commonly considered to be active if they have moved one or more times in the last 10,000 years (USGS)

6 Facts on Earthquake

Suddenly

Anywhere in Indonesia

Cross generation

Impact any people

Short duration on damage

Without warning

Tim Pemutakhiran Peta Sumber dan Bahaya Gempa Nasional 2017

STEERING COMMITTEE

ADVISORY BOARD

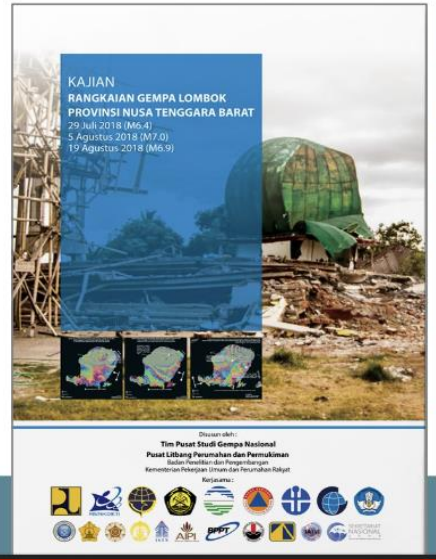
TECHNICAL COMMITTEES
Prof. Masyhur Irsyam
Ir. Lutfi Faizal

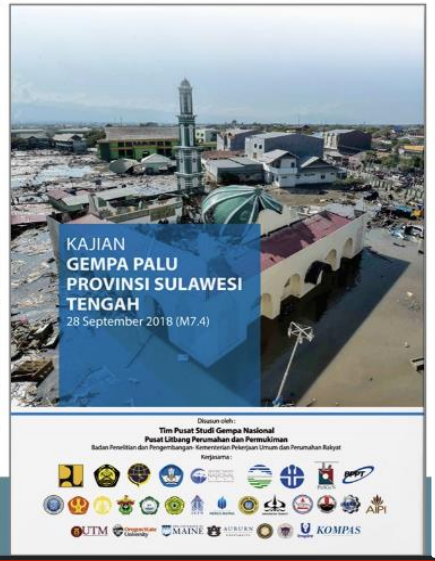
PuSGeN
Pusat Studi Gempabumi Nasional
The National Research Center for Earthquake

International Collaboration: ANU/GeoScience Australia, GEM-Italy, USGS-USA

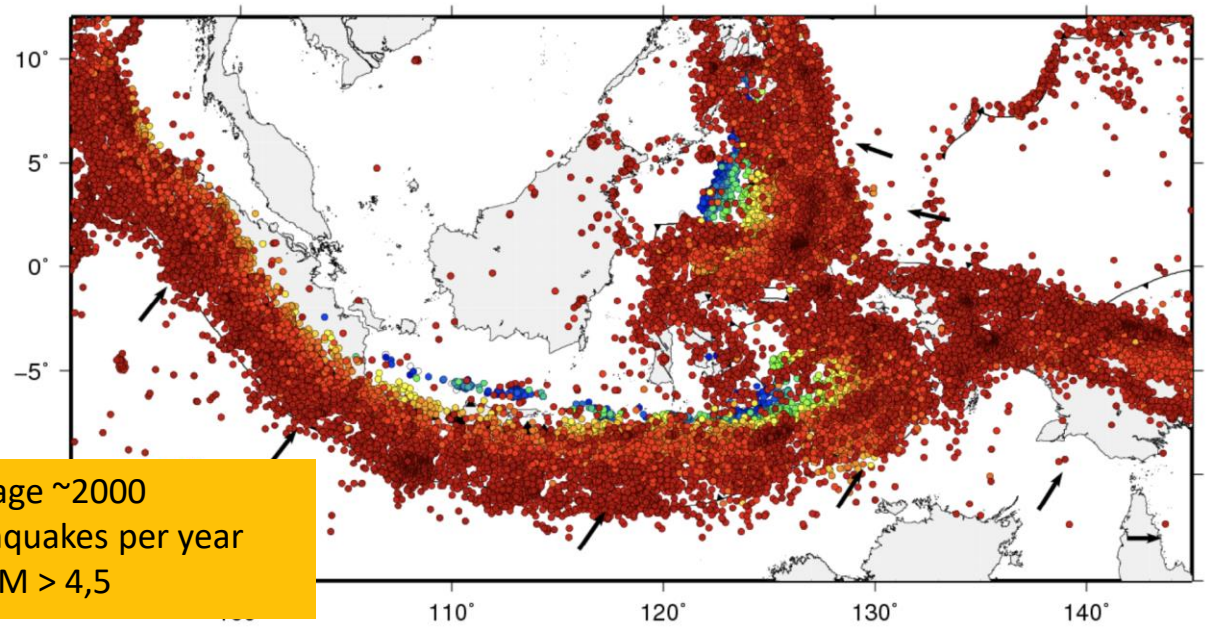
Jumlah Anggota = 72 orang

GEOLOGY WORKING GROUP	GEODESY WORKING GROUP	SEISMOLOGY + INSTRUMENTATION WORKING GROUP	GMPE WORKING GROUP	CATALOG WORKING GROUP	SEISMIC HAZARD WORKING GROUP
Dr. D.H. Natawijaya	Dr. Irwan Meilano	Prof. S Widiyantoro	Ariska R., MSc	Dr. Wahyu Triyoso	Dr. Sri Hidayati

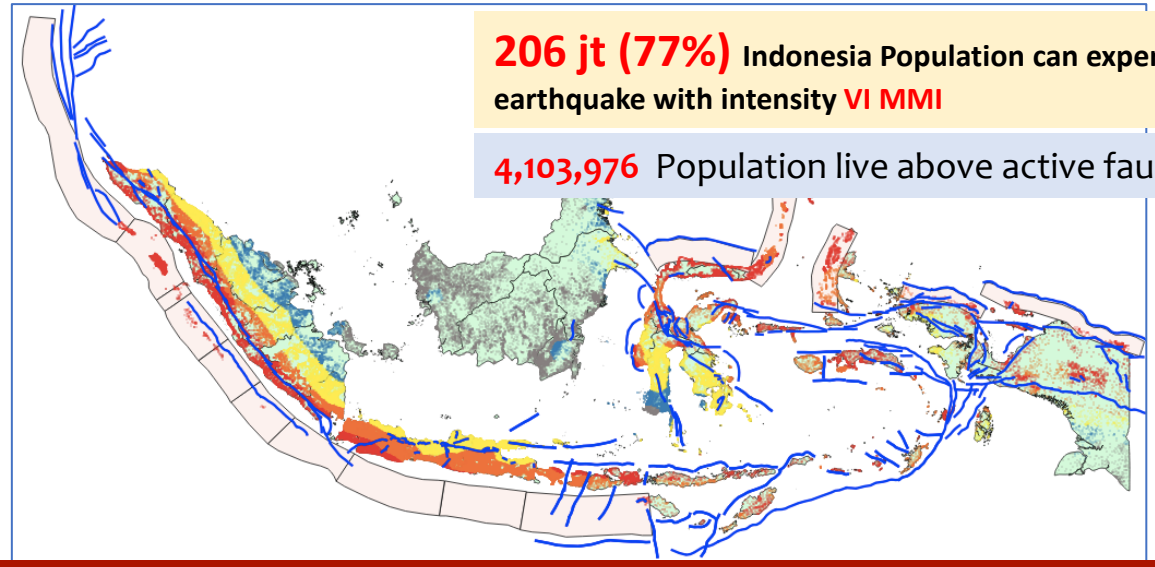




Tectonics in Indonesia

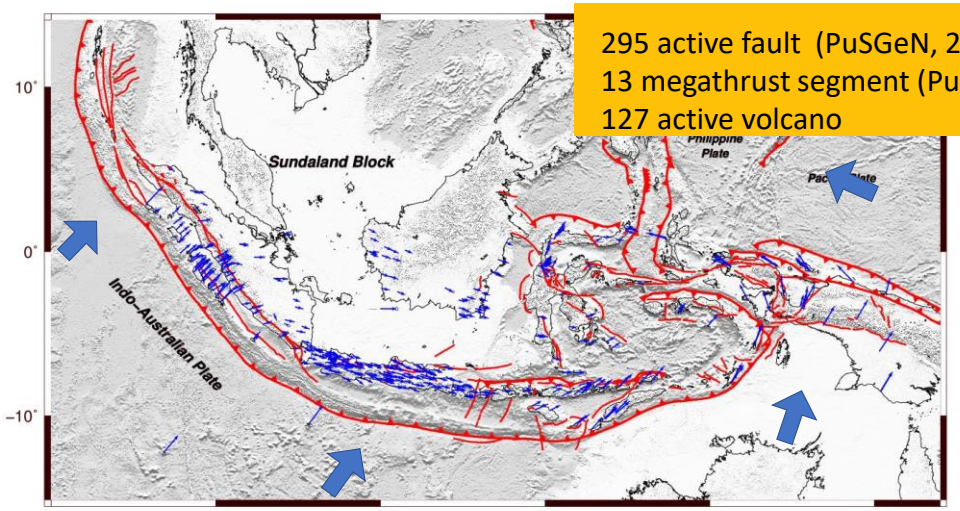


Average ~2000 earthquakes per year with M > 4,5

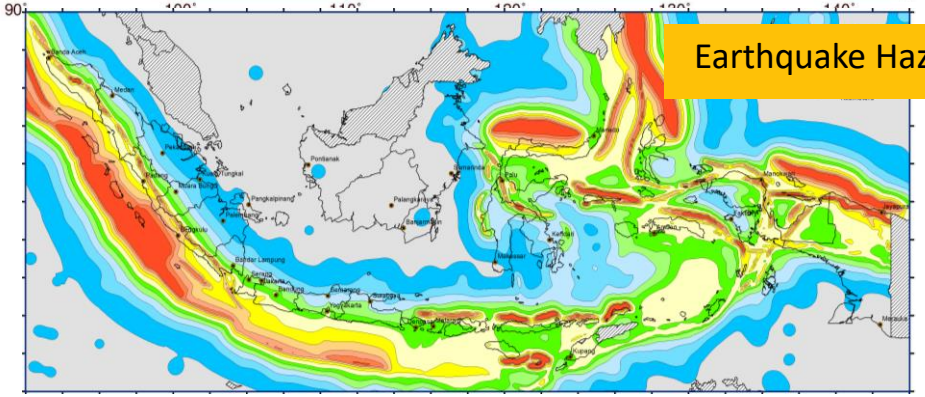


206 jt (77%) **Indonesia Population can experience earthquake with intensity VI MMI**

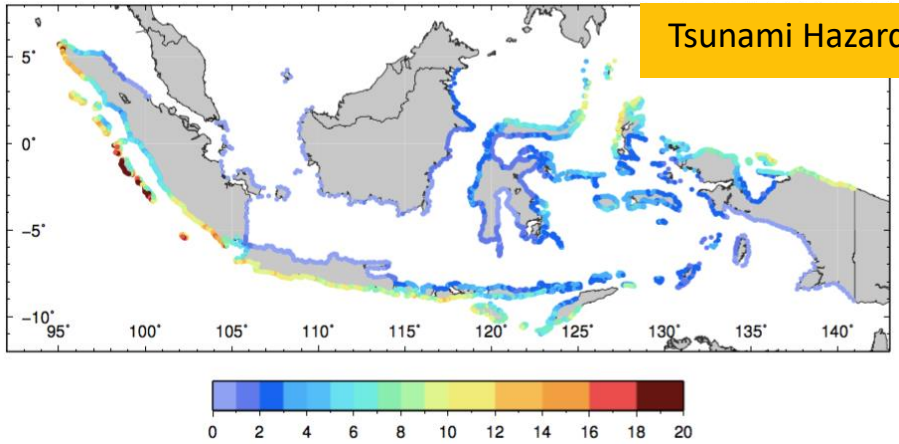
4,103,976 Population live above active faults



295 active fault (PuSGeN, 2017)
13 megathrust segment (PuSGeN, 2017)
127 active volcano



Earthquake Hazard Map



Tsunami Hazard Map

Earthquake Hazard

Primer Hazard :

Shaking

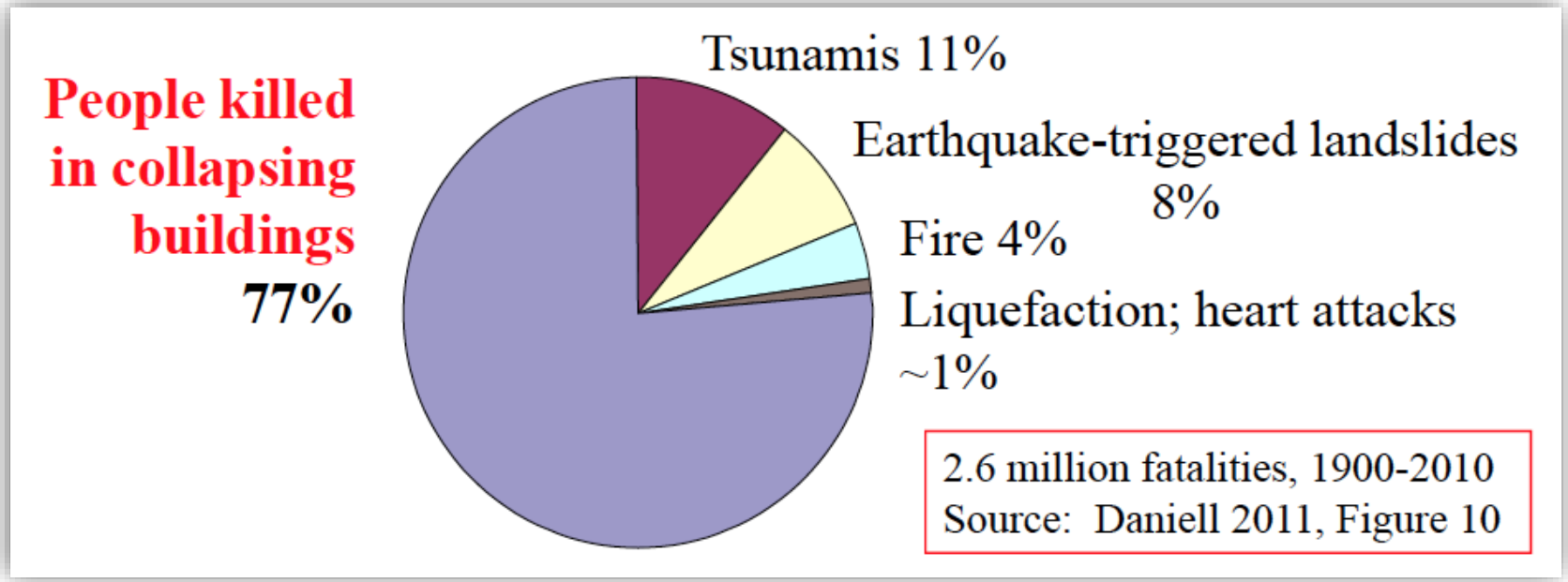
Surface Displacement

Secunder Hazard

Tsunami
Land movement
Landslide
Liquefaction
Fire
Disease

Disturbed Life

Source of Death at Earthquake



The 21 November 2022 Mw 5.6 Cianjur Earthquake

Typical damage dominated by building damage

→ **Mitigation can be done with building better on housing or retrofitting**

Ilustration on Building

Weak Brick Structure at large Earthquake

Strong Brick Structure at large Earthquake (with wooden frame)

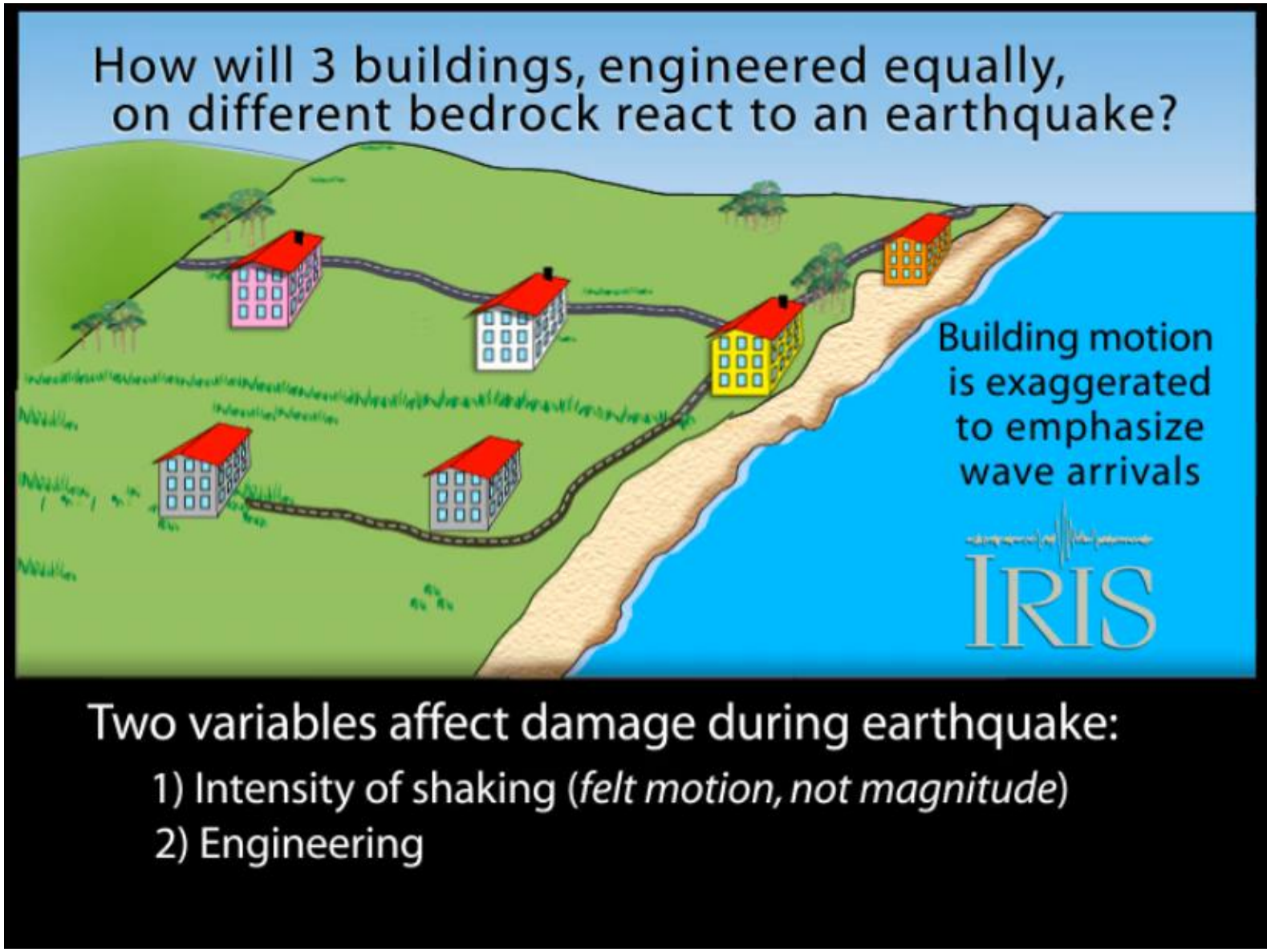
Source: Prof. Yoshiyuki Kaneda, 2018. SATREPS Turkey and Japan

Lessen Learn from Red Zone Map based on Risk Assessment after the 2018 Palu Earthquake (M7.4)

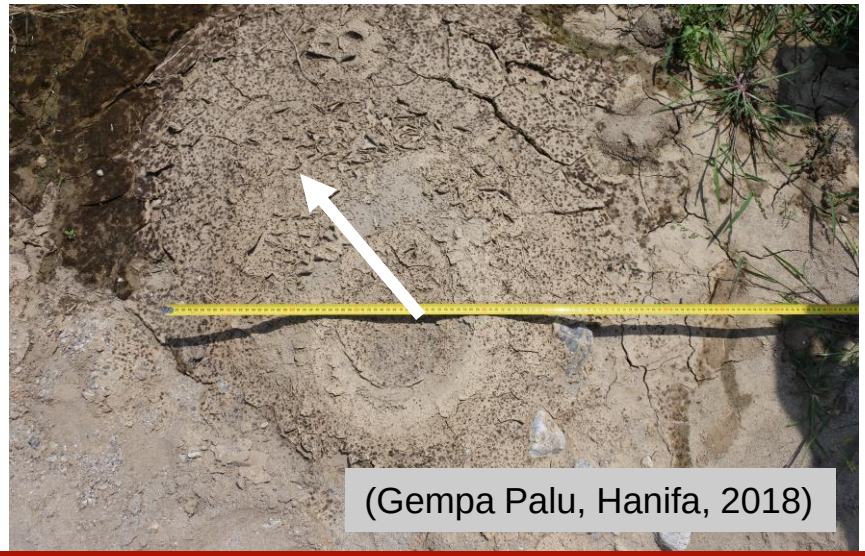
Red Zone:

- **Super-shear Earthquake,**
- **Strike-slip+marine landslide driven tsunami,**
- **Massive flow-slide liquefaction**

Earthquake Secondary Impact : Liquefaction



(Gempa Lombok, Hanifa, 2018)

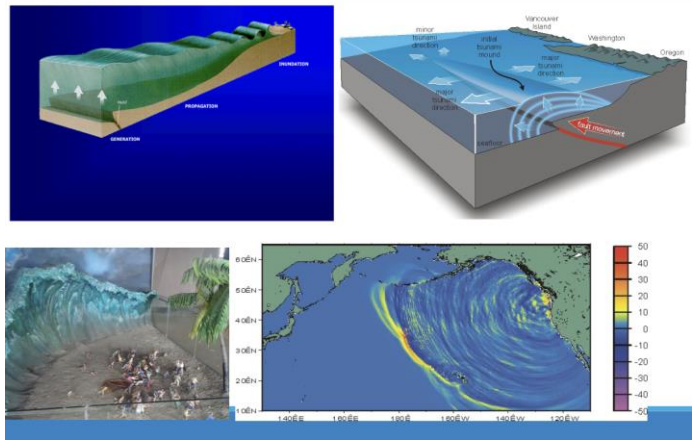

(Gempa Palu, Hanifa, 2018)

Earthquake Secondary Impact : Landslide

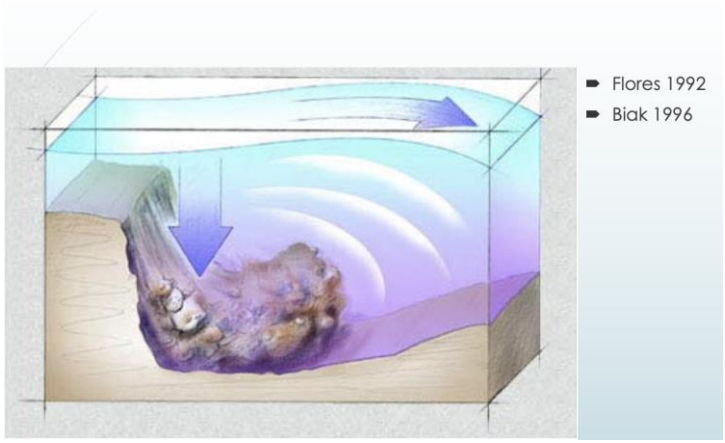
Dokumentasi PuSGeN – 2018 Lombok @Astyka Pamumpuni

Earthquake Secondary Impact : Tsunami

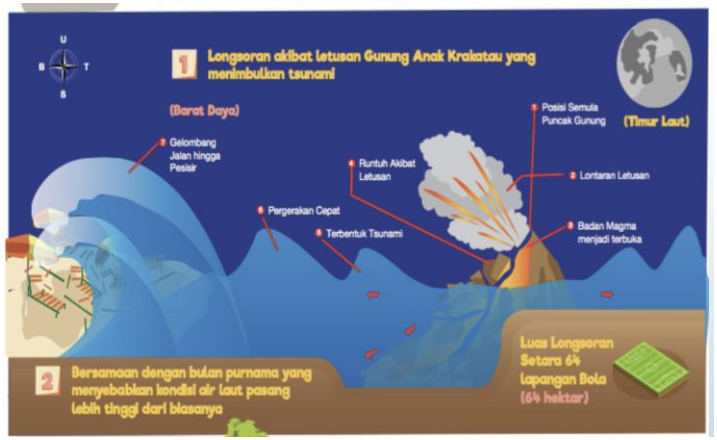
1. Submarine Earthquake



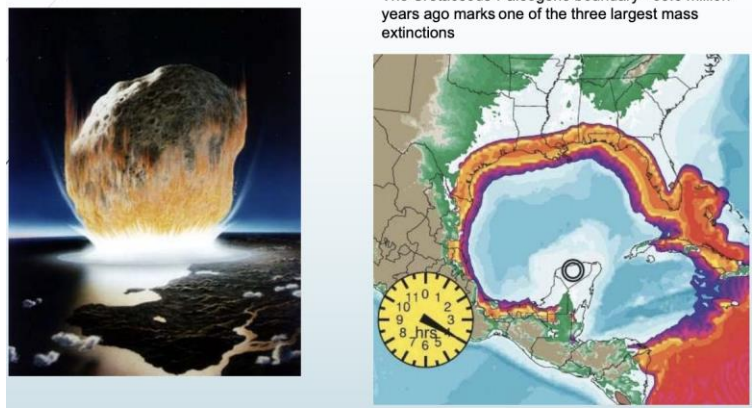
2. Submarine Landslide



3. Volcanic Landslide



4. Asteroid Impact



- Earthquake
- Volcanic Eruption
- Sea floor landslide
- Meteor hit sea

~ 80-90% tsunami caused by earthquake (Ward et al., 2011)

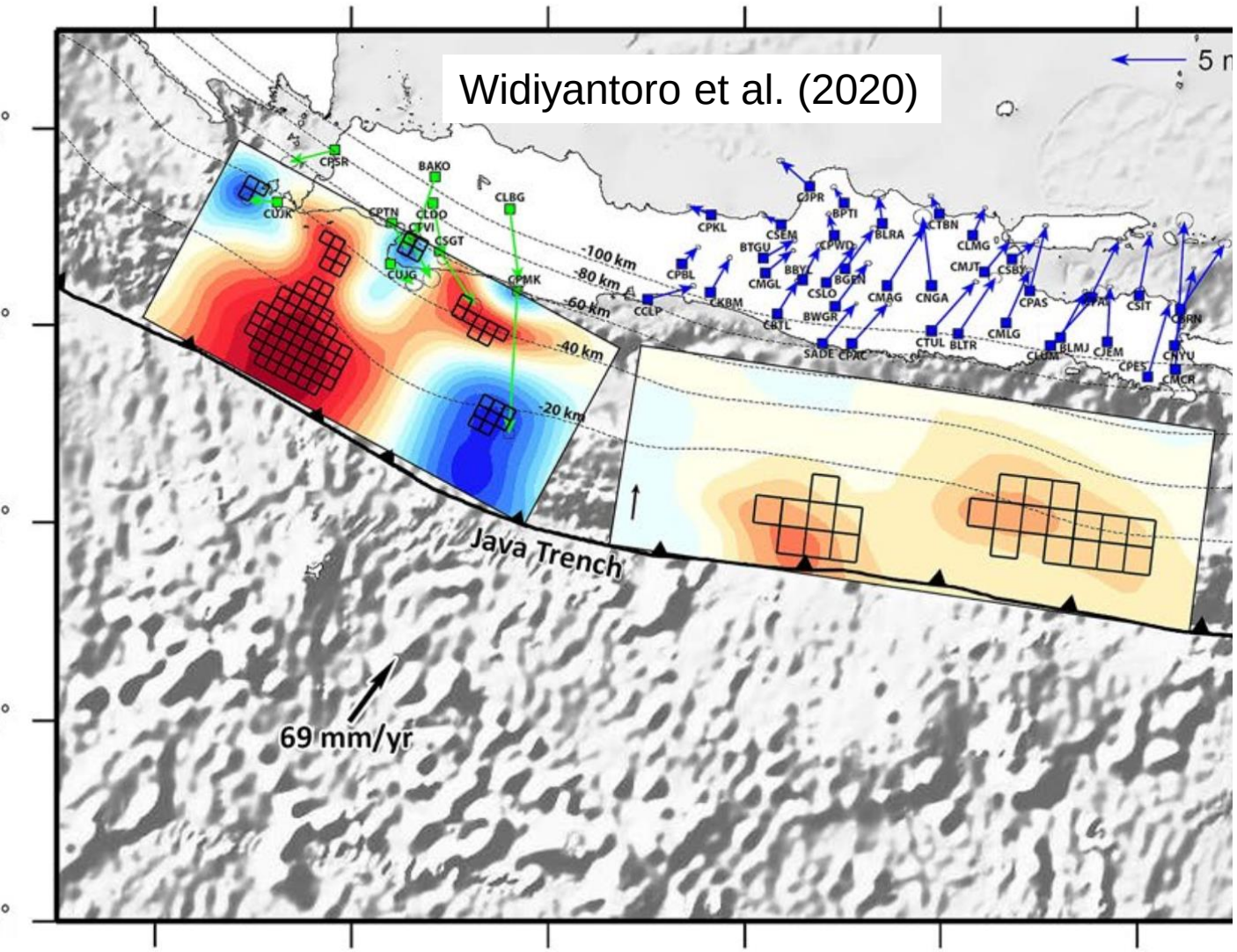
Impact of the 2004 Aceh Earthquake and Tsunami

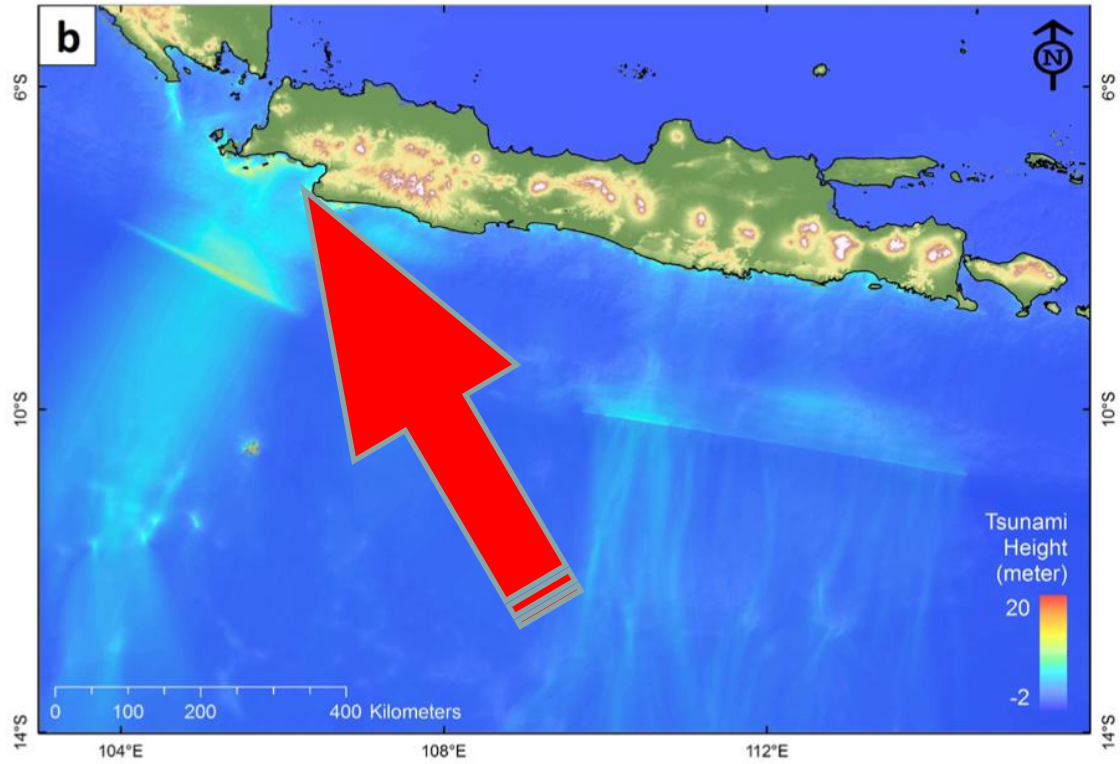
Banda Aceh 10 Years Later

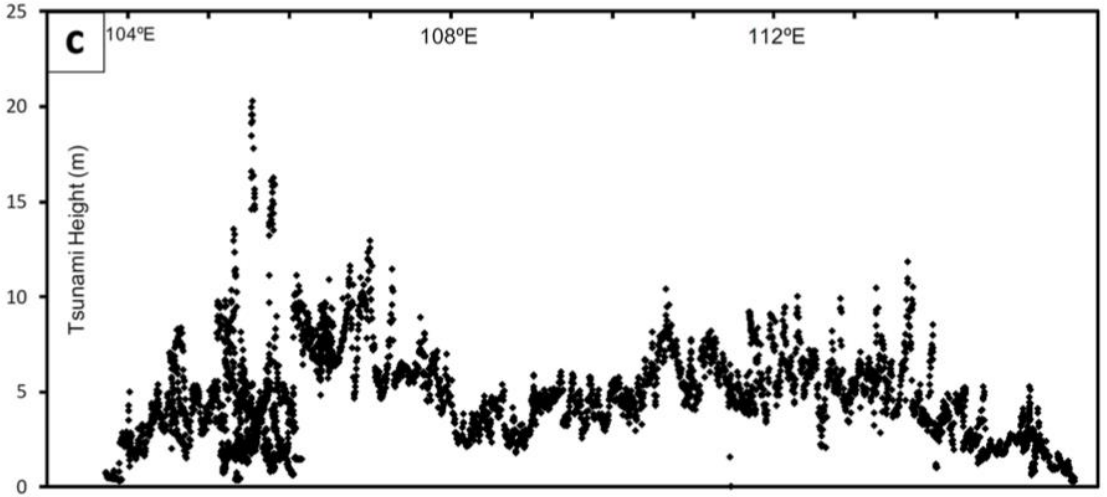
2004-2014

Coastal Highway in Aceh Besar District

TSUNAMI ASSESMENT







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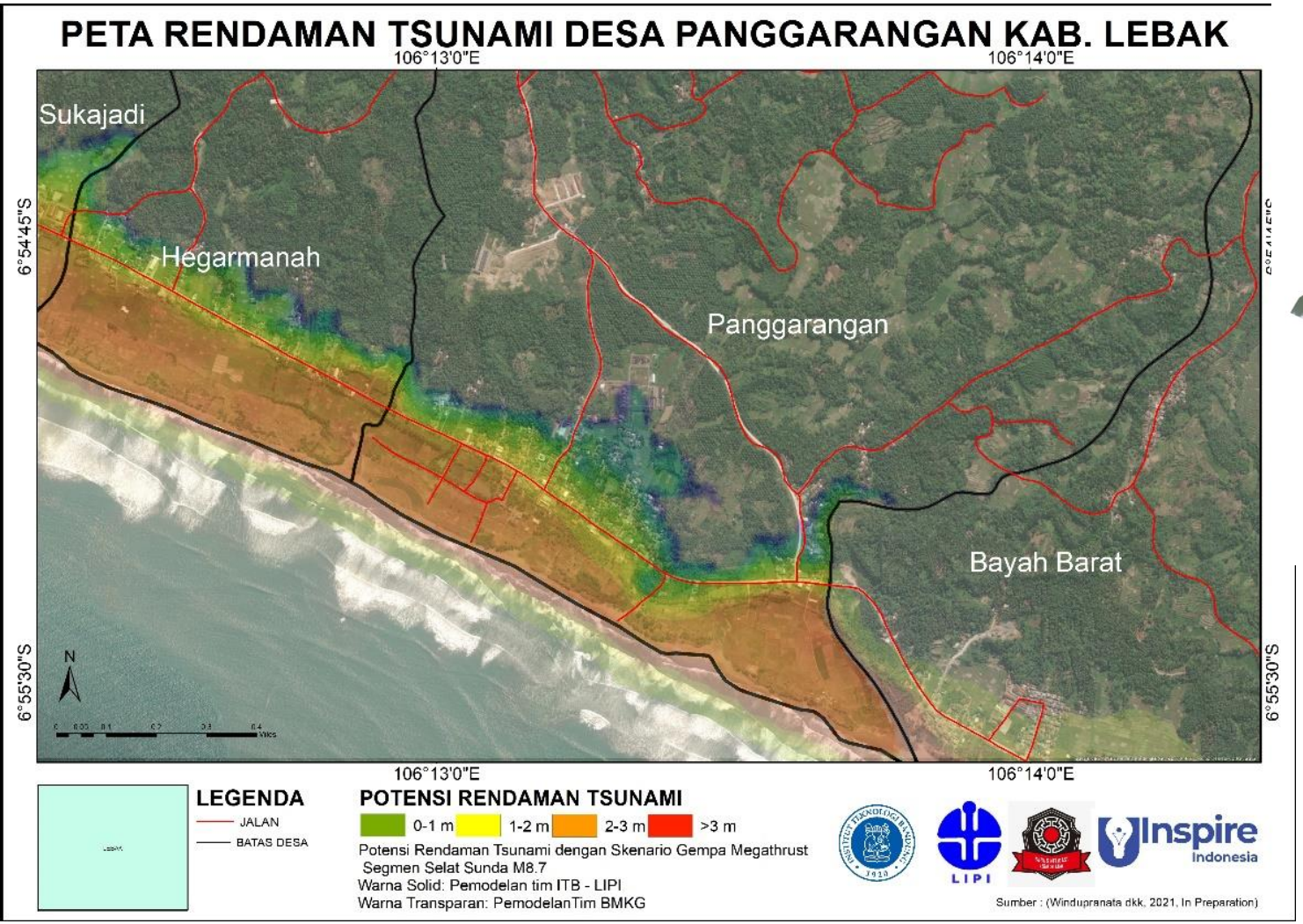
2021

2022

TSUNAMI @PANGGARANGAN



TSUNAMI @PANGGARANGAN

HAYU URANG SIAGA CAAH LAUT

Siap Siaga Tsunami

Sejarah Gempa di Lebak

PETA SEISMISITAS BANTEN DAN SEKITARNYA (1963-JUNI 2021)

Apakah Tsunami itu?

Tsunami adalah serapan bahasa Jepang. Tsu berarti pelabuhan, dan nami berarti gelombang. Jika diartikan, Kata tsunami memiliki arti ombak besar di pelabuhan. Kita sering menyebut tsunami dengan istilah "CAAH LAUT".

Pahami Makna Rambu berikut ini!

Peringatan Zona Bahaya Tsunami / gempa

Peringatan bahwa Anda telah berada pada kawasan rawan bencana tsunami/gempa

Titik Kumpul

Petunjuk tempat kumpul, Mengindikasikan lokasi yang aman atau daerah yang lebih tinggi untuk evakuasi saat terjadi tsunami

Arah Evakuasi

Petunjuk menuju lokasi evakuasi tsunami

Rambu di atas berdasarkan yang ada di lebak dan SNI/Perka BNPB No 7/2015

PETA JALUR EVAKUASI DESA PANGGARANGAN, LEBAK, BANTEN

Legenda

Rendaman Tsunami

0 - 0.5 m | 0.5 - 3 m | >3 m

Tempat Evakuasi

Jalan Setapak | Jalur Motor | Jalur Mobil

Estimasi Waktu Tiba Tsunami : 15 menit

Waktu menuju T.E.S dengan berjalan cepat : 11-17 menit

Evakuasi Mandiri!

Ke tempat evakuasi terdekat jika mengalami salah satu atau lebih ciri-ciri akan terjadinya tsunami

- Gempabumi yang kuat atau yang berlangsung lama
- Melihat gelombang laut yang tidak biasa (berbuih tiba-tiba surut menjalar dapat ke arah darat, bergemuruh)
- Terdengar suara gemuruh dari arah laut, biasanya disertai angin kencang
- Mencium yang tidak biasa seperti bau belerang yang kuat atau bau amis
- Melihat reaksi hewan yang tidak biasa, misal berlari menjauhi pantai
- Mendapat pemberitahuan akan ada tsunami, atau terdengar suara sirine peringatan tsunami

- Tetap tenang
- Matikan semua sumber listrik dan sumber api
- Bawa tas siaga jika bisa
- Tetap berada di tempat evakuasi sampai mendapat arahan dari pihak berwenang

3 LANGKAH TANGGAP TSUNAMI

Tanggap Gempa

- Waspadalah, gempabumi yang kuat atau yang berlangsung lama dapat memicu tsunami dalam waktu singkat
- Jauhi pantai dan tepi sungai, serta cari informasi apa yang akan terjadi

Tanggap Peringatan

- Dapatkan informasi dari peringatan dari BMKG melalui TV Nasional, radio daerah, atau pengumuman di sekitar Anda
- Jika terdengear bunyi sirine, kentongan, atau peralatan lain yang sudah disepakati, segera dievakuasi.

Peringatan BMKG memberikan STATUS ANCAMAN tsunami untuk setiap daerah

- AWAS — Status ancaman tertinggi — Warga harus evakuasi!
- SIAGA — Status ancaman sedang, namun masih berbahaya — Warga harus evakuasi!
- WASPADA — Status ancaman rendah — Warga harus menjauhi pantai dan tepi sungai!

Tanggap Evakuasi

- Setelah gempabumi atau menerima peringatan tsunami, segera evakuasi ke lokasi yang aman.
- Ikuti jalur dan rambu evakuasi, jika ada.
- Jika lokasi aman tidak diketahui, larilah sejauh mungkin dari pantai, naiklah ke tempat tinggi.

DALAM DAERAH YANG RAWAN GEMPA,
GEMPA DAPAT MENYEBABKAN TSUNAMI.
CEK ANCAMAN DAN RESIKO DENGAN APLIKASI

Linktree
https://linktr.ee/AplikasiKesiapsiagaanBencana

BUKAN GEMPABUMI DAN TSUNAMI YANG MEMBUNUH TAPI KETIDAK TAHUAN DAN SIKAP TIDAK PEDULI KITA.

BMKG unesco BNPB UMN BRIN Inspire Indonesia BINER DEV BSI BANK SYARIAH INDONESIA KIDZSMILE

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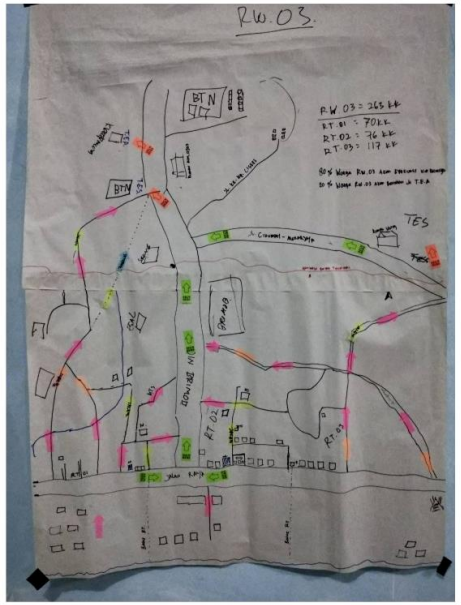

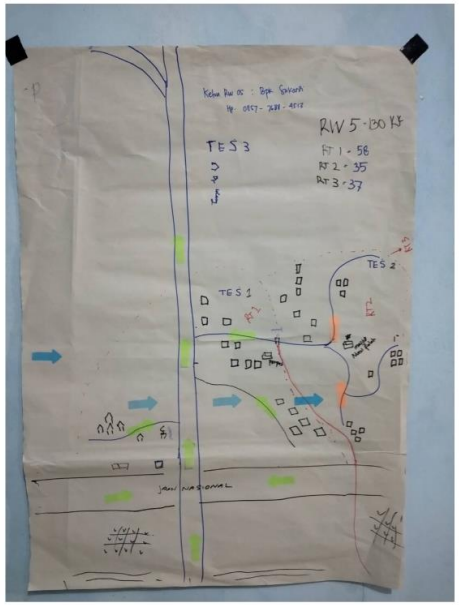

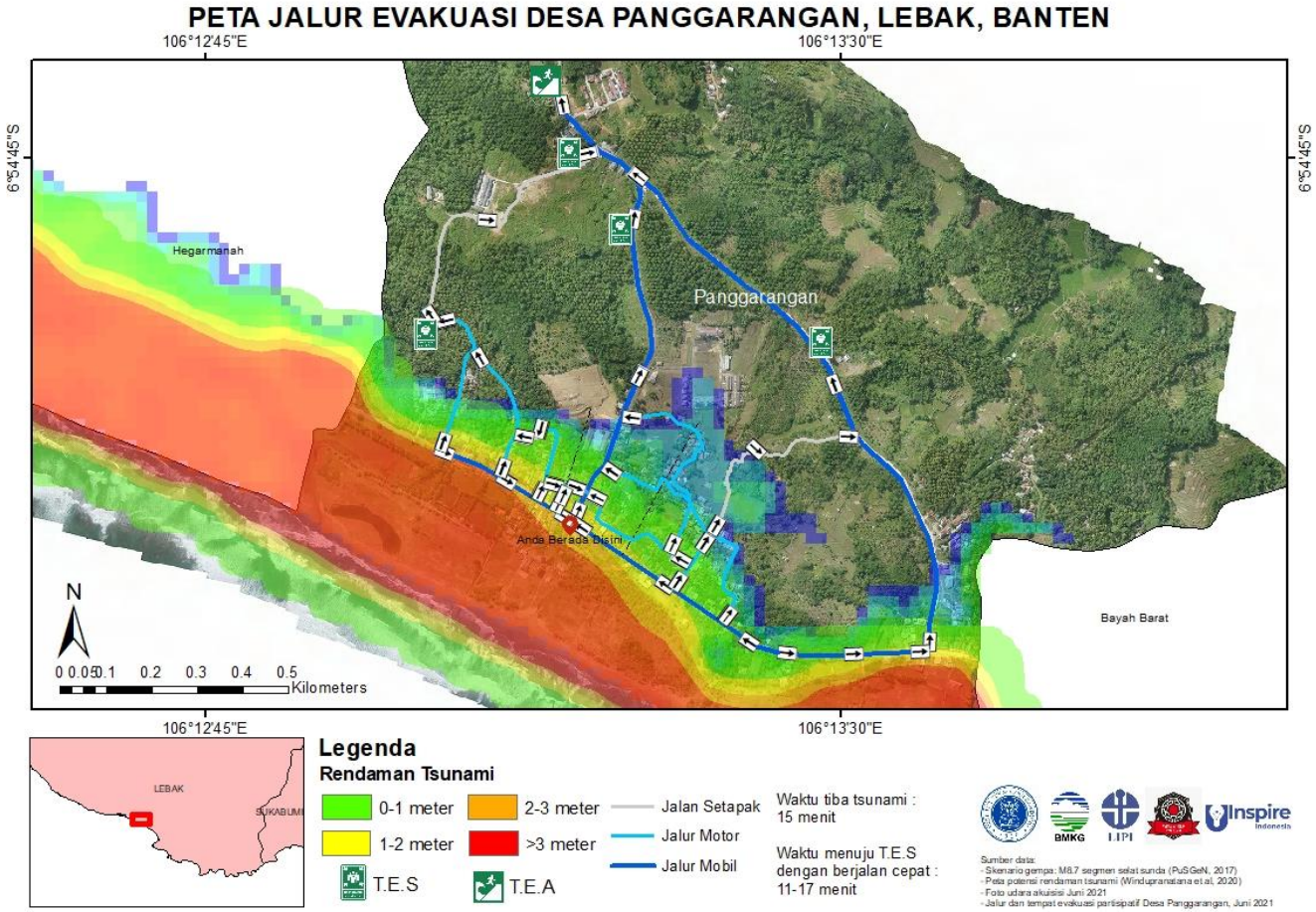

TSUNAMI @PANGGARANGAN

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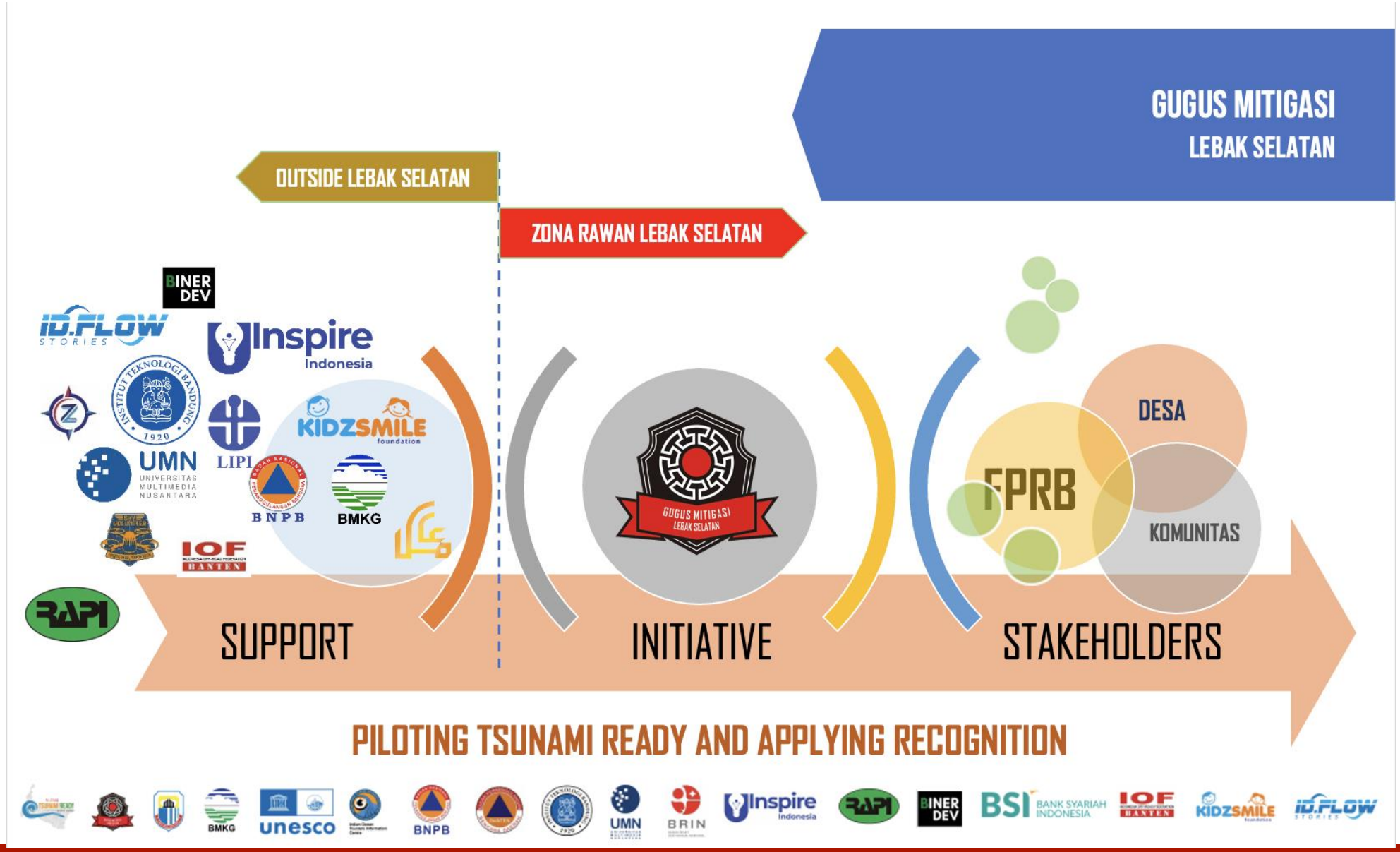
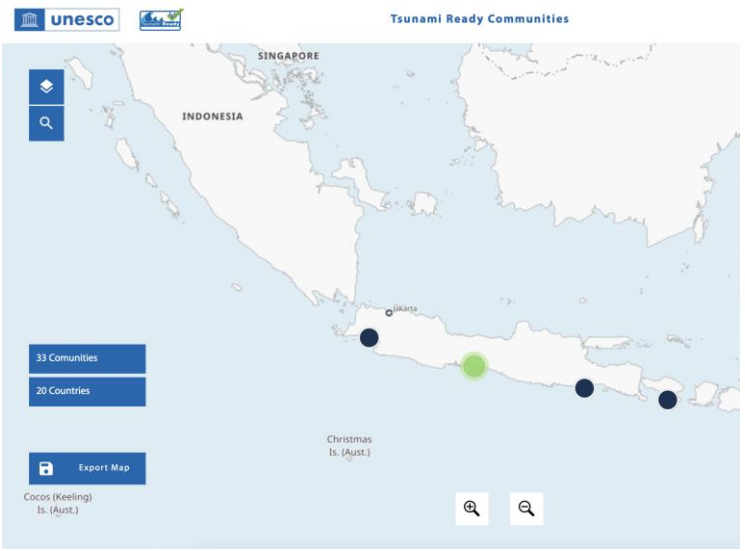


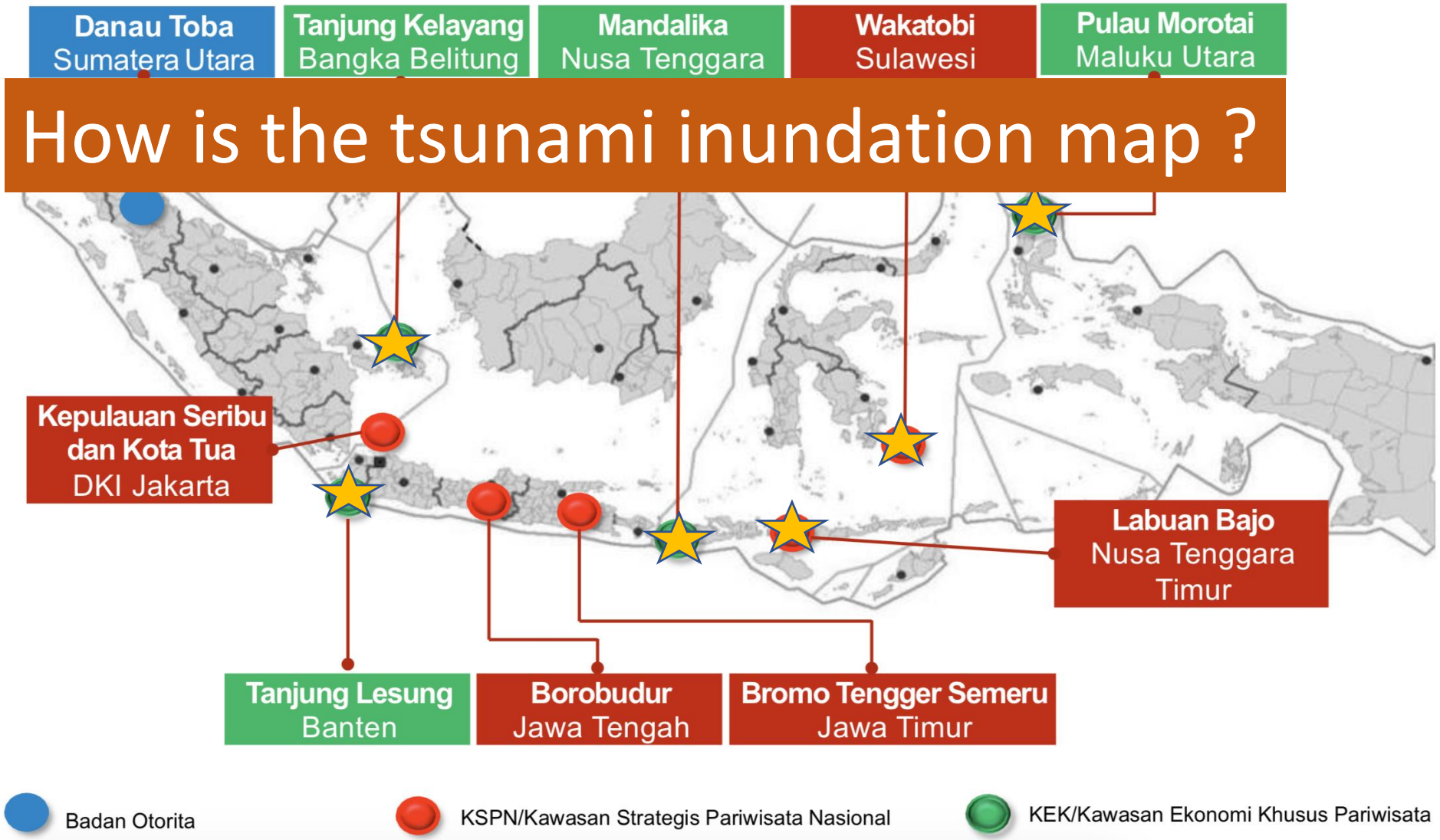
Tsunami Ready



	TSUNAMI READY INDICATORS
I	**ASSESSMENT (ASSESS)**
1	**ASSESS-1**. Tsunami hazard zones are mapped and designated.
2	**ASSESS-2**. The number of people at risk in the tsunami hazard zone is estimated.
3	**ASSESS-3**. Economic, infrastructural, political, and social resources are identified.
II	**PREPAREDNESS (PREP)**
4	**PREP-1**. Easily understood tsunami evacuation maps are approved.
5	**PREP-2**. Tsunami information including signage is publicly displayed.
6	**PREP-3**. Outreach and public awareness and education resources are available and distributed.
7	**PREP-4**. Outreach or educational activities are held at least 3 times a year.
8	**PREP-5**: A community tsunami exercise is conducted at least every two years.
III	**RESPONSE (RESP)**
9	**RESP-1**. A community tsunami emergency response plan is approved.
10	**RESP-2**. The capacity to manage emergency response operations during a tsunami is in place.
11	**RESP-3**. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place.
12	**RESP-4**. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place.

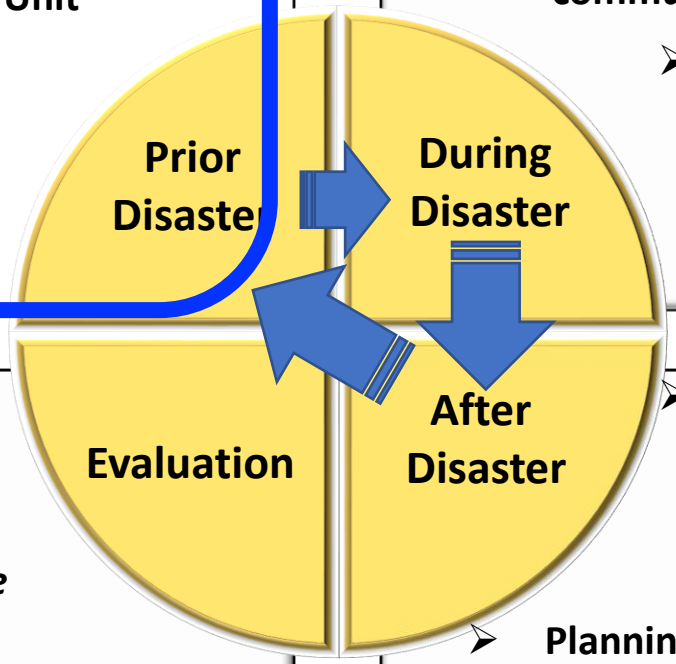
The 10 National Priority Tourism Economic Zones

How is the tsunami inundation map ?



Disaster Mitigation Flow

- Identify earthquake sources, tsunami threat level
- Conduct Risk Assessment at the Tourism Area Level
- Build Infrastructure according to minimum standards that are resistant to disasters
- Setting up disaster insurance
- Prepare for Disaster Preparedness Efforts
  - Establish a Special Disaster Management Unit
  - Develop emergency response SOPs
  - Education and Training
  - Providing Critical Facilities; Temporary Evacuation Routes & etc.



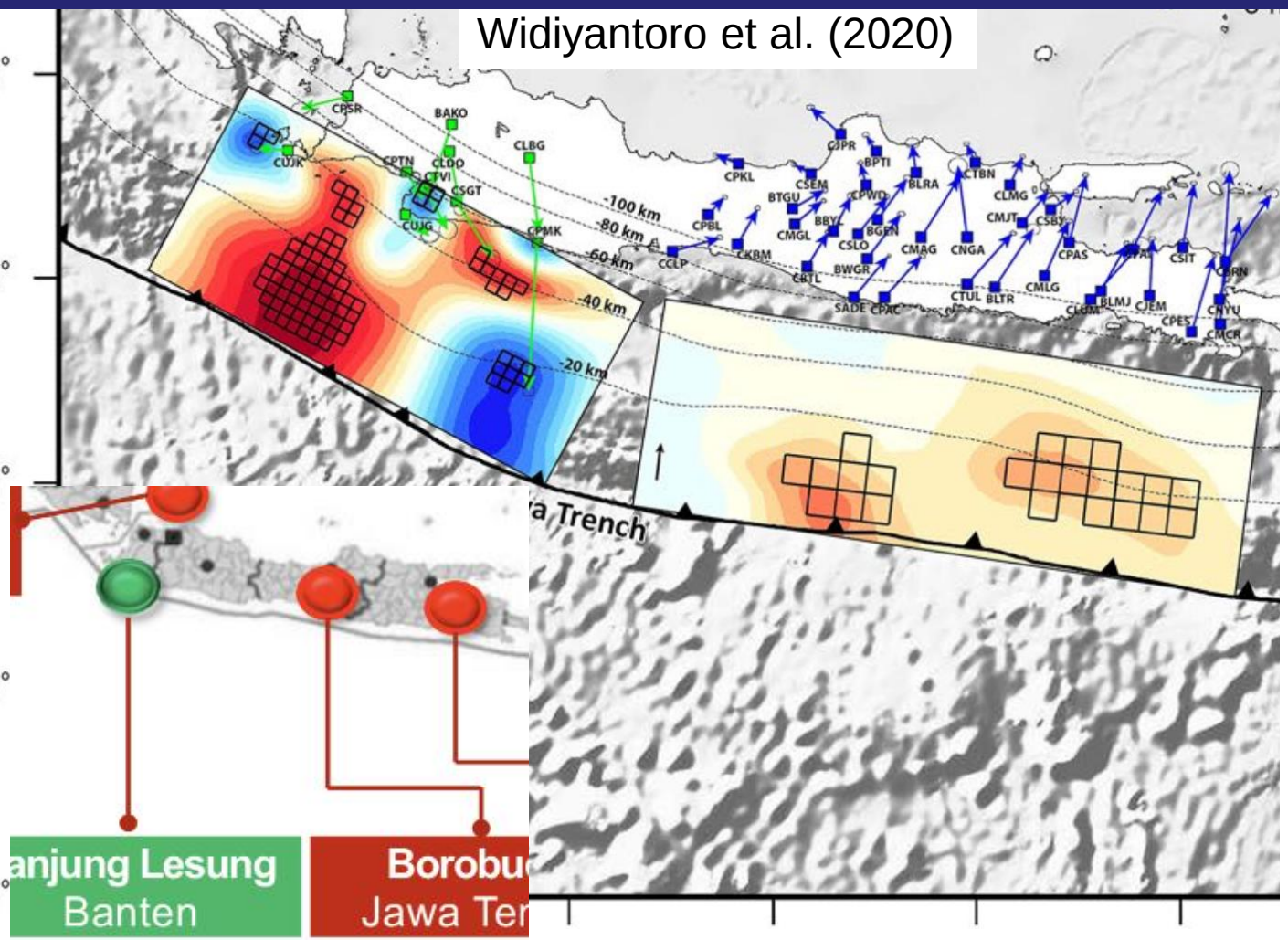
- Command System: The Unit Head controls the operational activities of disaster management and is responsible to the Regional Head
- Implementation of emergency response SOP
  - Disseminate information via crisis control center and communications (Early Warning System)
    - Utilize disaster emergency response equipment

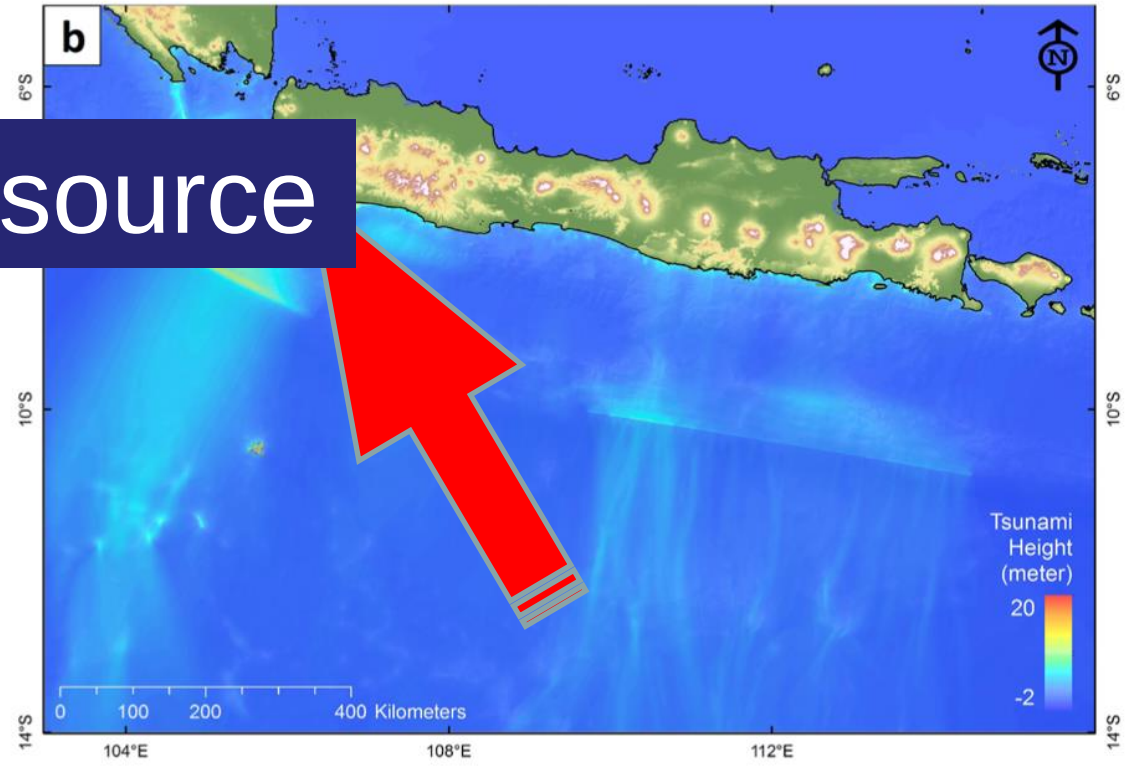
- Continue hazard source monitoring
- Carry out disaster mitigation efforts in the framework of recovery
  - *Built back better, safer, and sustainable*
- Review planning documents
- Monitor physical and non-physical recovery on a regular basis

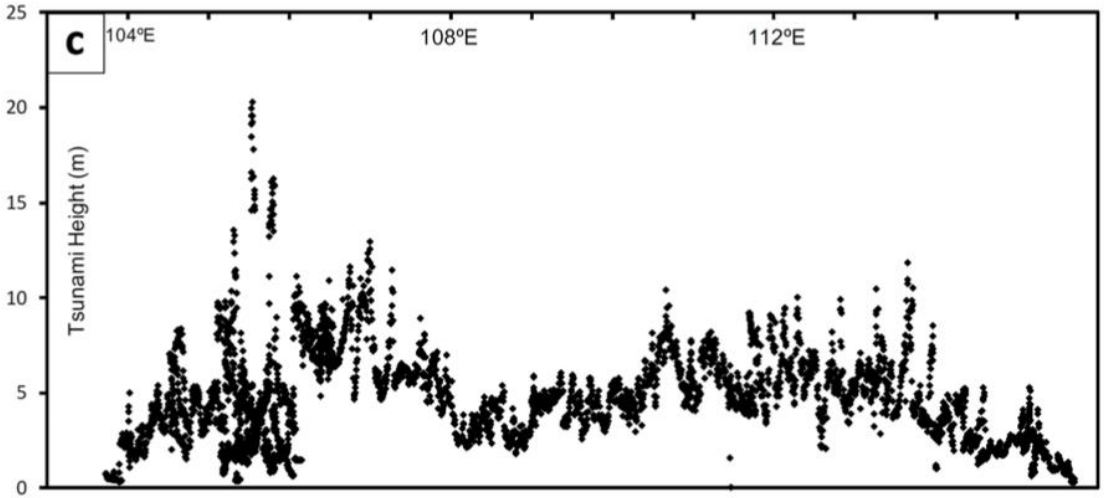
- Collecting data and assessing the impact and future disasters
  - Reviewing area facilities and infrastructure
  - Analysing hazard source
- Planning repairs and rebuilding
- Coordinating and cooperating with related parties for Rehabilitation and Reconstruction

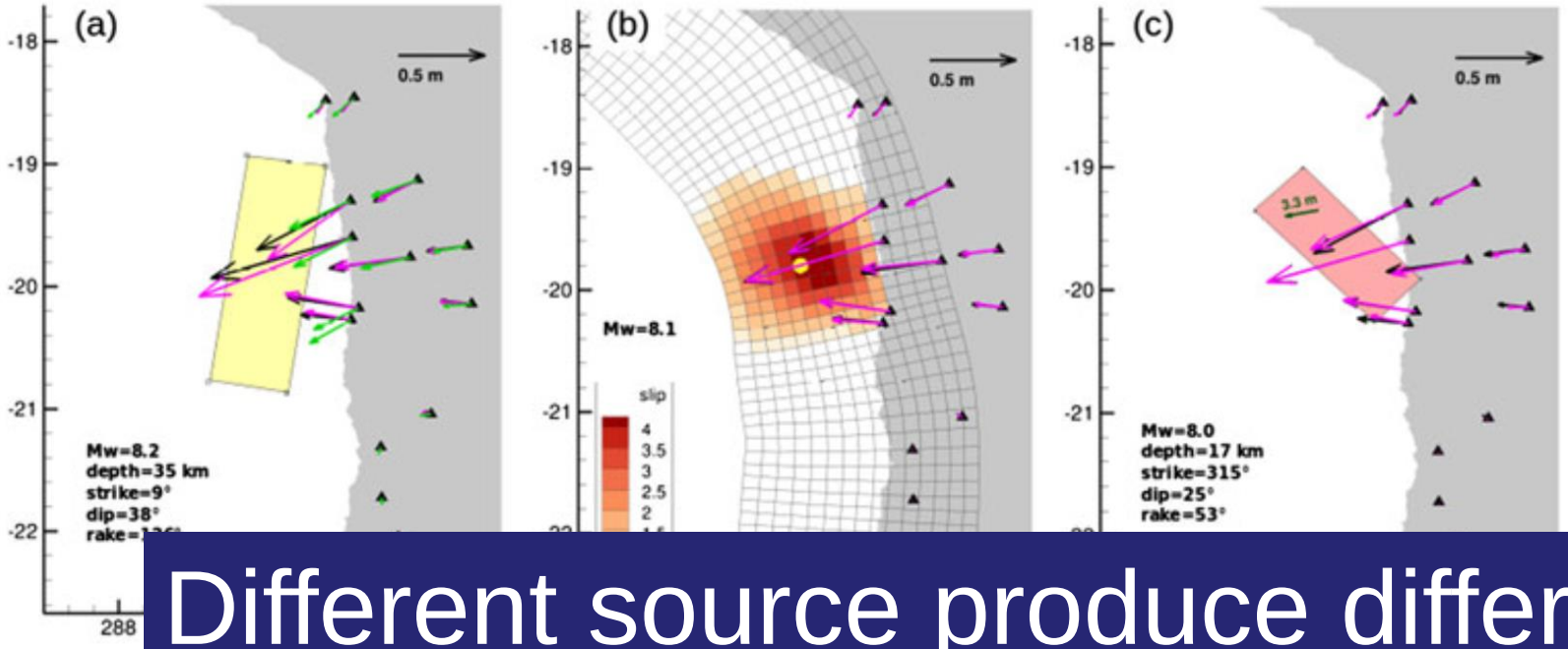
The key is understanding the source

Widiyantoro et al. (2020)

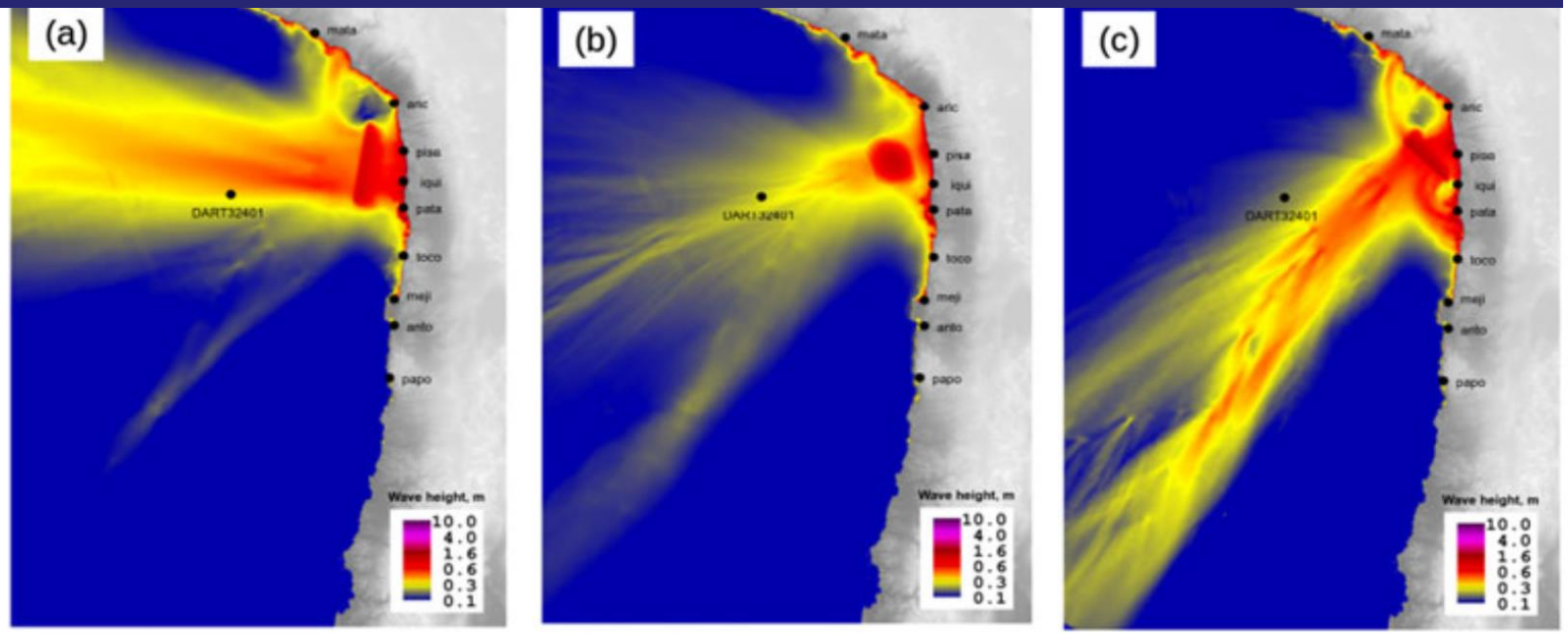




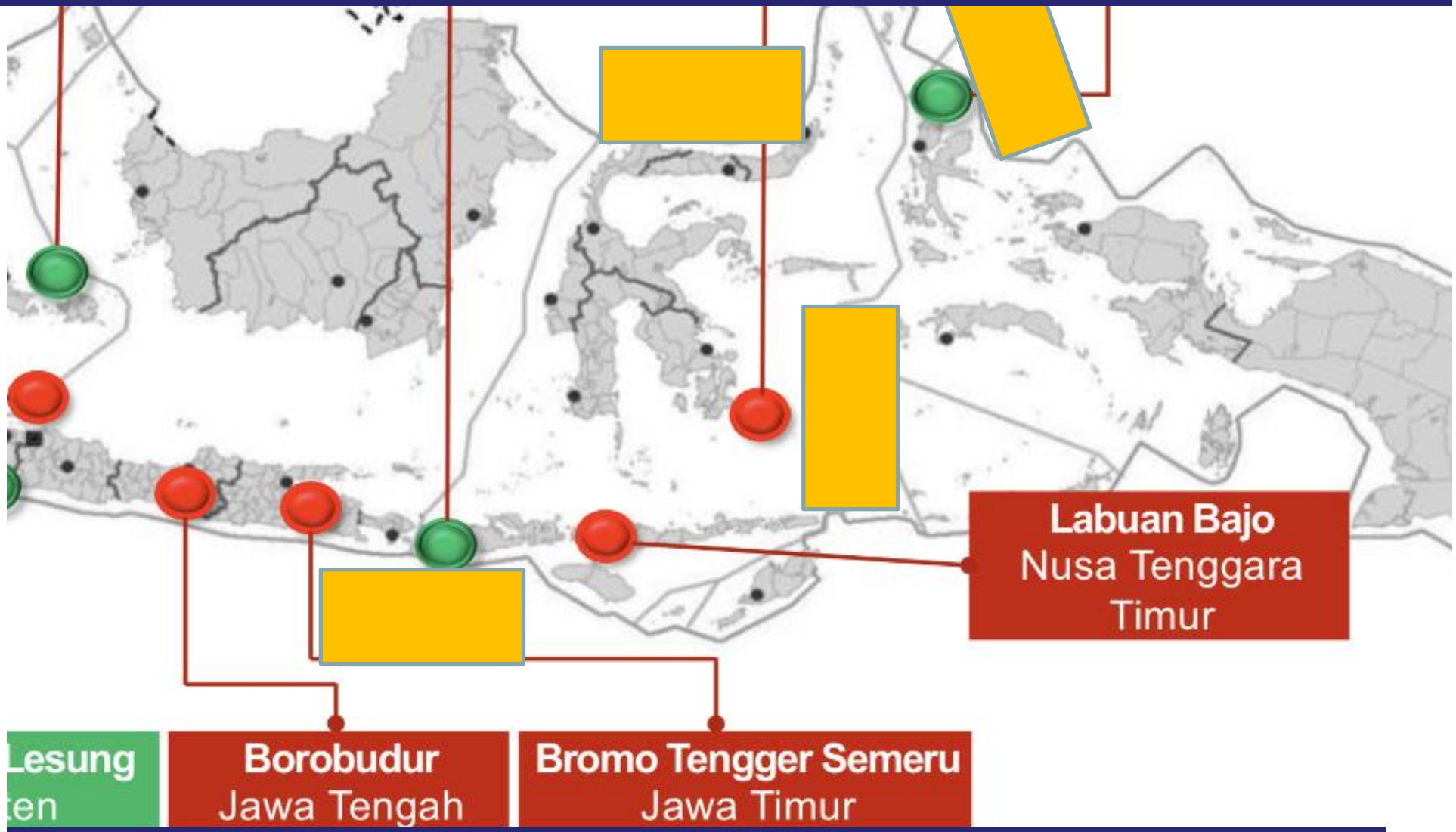




Different source produce different tsunami height



Potential earthquake source are not known



Further investigation need to be done


THANKYOU