The 6th Annual Scientific Meeting on Disaster Research 2019
International Conference on Disaster Management

PROCEEDING BOOK VOL. 1

Social and Technological Innovation on Disaster for Industry 4.0

INDONESIA DEFENSE UNIVERSITY, BOGOR

18 - 19 JUNE 2019

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PREFACE

Praise be upon the Almighty God for allowing the completion of the Proceeding of ICDM 2019 which held in the 6th Annual Scientific Meeting on Disaster Research 2019. ICDM 2019 was held at Indonesia Defense University and Indonesia Disaster Relief Training Ground (INA-DRTG) on 18 – 19 June 2019. This proceeding is a documentation of scientific work by academics, bureaucrats, practitioners, and community members who are participate in ICDM 2019.

The committee has received more than 220 manuscripts from national and international participants. After going through review process by our esteemed team of reviewers, there are 118 manuscripts to be included in a four-volume proceeding. The proceedings will be available for download on our website. The manuscripts will discuss following themes: Strengthening Local Partners to Reduce Disaster Risk; Innovation and Disruption in Disaster Management Technology; Social Engineering in Technology Application of Disaster; Early Warning System Technology, Preparedness and Society Communication; The Role of Local Wisdom as a Creative Consideration in Managing Local Disaster; The Role of National Resilience as a Consideration in Disaster Management; Innovation and Application of Disaster Management; Disaster Management in Industrial Areas; Strength of Science and Technology in Disaster Management to Reach the SDGs; and Smart and Resilience Cities.

Lastly, we are truly grateful to all parties who supports this event: keynote speakers, invited speakers, committees, moderators and reviewers, and all of the authors and participants. We hope that all participants can make the best use of this event as the best practice for managing and reducing disaster risks in the future.

Conference Chairman,

FADM Dr. M. Adnan Madjid, SH., M.Hum
Vice Dean of Faculty of National Security
Indonesia Defense University

KEYNOTE SPEECH

First of all, let us raise our most gratitude to God the Almighty, for giving us his blessing, and allowing us to finish the series of proceedings of the sixth Annual Scientific Meeting Disaster Research, the International Conference on Disaster Management (ICDM 2019).

As has been declared, that one of the purposes of the Sixth Annual Scientific Meeting Disaster Research is to implement planners to improve research culture, to provide comprehensive, holistic and systematic thinking contributions. Then, the theme of this year's meeting is: **"Social and Technological Innovation on Disaster for Industry 4.0"**

The theme is important to be raised, considering the dynamics of geopolitics and geostrategic development, and development of dynamic technology, that impact on challenges and threats which are complex, including challenges on state defense. The various threats are military threats, nonmilitary threats, and hybrid threats, which can be grouped into real threats or unreal threats. One of the real threats faced by the Indonesian is a natural disaster.

Last year, many disasters happened in Indonesia so the efforts to prepare ourselves for disasters become a very important focus. The loss of a big disaster was beyond our expectation. Our highly risk and vulnerability rate that detain us in disaster management efforts to save human life or minimize loss.

In handling disaster, it doesn't require speed only, but also accuracy. Industrial revolution 4.0 is marked by the emergence of artificial intelligent, internet of things, robotic, and 3-d. Everything will assist the implementation of disaster management in every prevention phase, emergency response, or rehabilitation and reconstruction phase.

Complete information about hazards in a region will be well analyzed by the internet of things, artificial intelligent, including drones. These may help prevention phase. At the time of emergency response, it will also accelerate victims registration in insolated areas using drones or robotic faster that they may immediately get evacuated.

On the other hand, in rehabilitation and reconstruction stages, they can accelerate housing and other building development using very quick 3-d copy to easyly return and normalized community life. By so, the 4.0 industry must be used for the efforts of disaster management, especially in transforming towards reliable next generation in disaster management.

In the social aspect, social innovation is required for creation of disaster responsible communities. The innovation on social, educational, education and training aspects to improve special awareness and community behavior in disaster and remote areas, in order to be ready to save or reduce risk from disaster or actual disaster threats. IDU as state defense campus, focus to give attention from national and defense security aspects. In Law Number 3 of 2002 on State Defense, it is stated that disasters are non-military or non-traditional threats. It is important to protect the community and the environment of extreme disasters.

In this context, this disaster is considered as a full threat of inaccuracy that will come around the distribution of vulnerable communities, communities that are low

capacity against natural, non-natural or social threats. That is why, the community should be enhanced to be able to face disaster to avoid on the impact of victims and damages that are done. The sinergry in facing such disaster threats is required, so the stakeholders must be involved actively, planned, direct, and holistic as well as universal. Involving pentahelix elements which government, community, business sector, higher education and mass media. Moreover, the role of wisdom for development, for example togetherness, culture, religion, vocationality, trust, tradition, religion, experience in disaster. Such things have been appreciated by the un as a global champion for disaster risk reduction.

Therefore, in the future, in facing such threats, we are not just partially depending on the power of conventional defense, but also the power of integrated and synergic defense, in order to create a harmony relationship, communication, coordination to face and overcome the threat together. Various abilities and advantages of each stakeholder to support the power of state defense. For those interests, IDU opens the study of disaster management that include the scope of national security faculty. Expected IDU graduates can construct their planning in disaster management. They also have a Disaster Study Center and Climate Change Adaptation (PSB-API), research activities, devotion to communities and other cooperation with national disaster management agency of indonesia.

In this good opportunity, we would like to express the best gratitude to the national disaster management agency of indonesia for a very intensive cooperation to support a learning in IDU, in particular on the disaster management product, and the trust that has been given to idu as the partner of the Sixth Annual Scientific Meeting on Disaster Research International Conference on Disaster Management (ICDM) 2019. Hopefully, this proceeding may contribute to the comprehensive and holistic thoughts for disaster management in Indonesia.

Rector of Indonesia Defense University,

LG Dr. Tri Legionosuko, S.IP., M.AP

Identification of Earthquake Hazard Zones Through Deterministic Seismic Hazard Analysis (DSHA) Method at Bandar Lampung City Based

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Abstract

Research on earthquake hazard zone analysis based on MASW data using deterministic methods in the Bandar Lampung which aims to determine the PGA (*Peak Ground Acceleration*) earthquake originating from the Srike-Slip Faults and the determination of soil classes based on Vs30 values. The method used is (i) identifying the earthquake source that affects the study area (ii) calculating the closest distance of the earthquake source to the study area (iii) calculating the attenuation function with Vs30 from MASW data (iv) calculating PGA *Bedrock* and *Soil*. The results of Vs30 data analysis for the city of Bandar Lampung show soil classes B, C, D to E, maximum values of land acceleration (PGA) in thelayer *bedrock* ranging from 0.0607g to 0.0752g. Meanwhile, maximum ground acceleration (PGA) inlayers *soil* ranges from 0.0637g to 0.1894g.

Keywords: *Deterministic, Vs30, PGA, Semangko Fault, Site Class.*

1. Introduction

Tectonically, the territory of Indonesia is a very complex and very active region that produces earthquakes that cause disasters. This area consists of three large tectonic plates namely Australian, Indian and Eurasian plates and nine small plates namely Burma plate, Maluku sea plate, Banda sea plate, Timor plate, Philippine plate, Caroline plate, Birdhead plate, Mauke

plate and Woodlark plate (Bird , 2003). Plate with a variety of different types of movements that have shaped the earthquake zone subduction (the subduction zone) and zone transform fault (the transform fault zone) that is now a source of seismic active zone.

The geological conditions of KBL which are still influenced by the *Sumatra Fault System* (SFS) and the tectonic activity subduction *of* the Indo-Australian plate towards Eurasia are also inseparable from the earthquake shocks caused by these two geological phenomena. So that the city of Bandar Lampung, which is the center of services, trade and economy in the province of Lampung, needs to anticipate all the impacts caused by the earthquake. One of them is by determining earthquake prone zones. Based on the calculation of the effect of the fault zone on the area around the fault zone, the Semangko fault has *Peak Ground Acceleration* a fairly high (PGA) value. So that it can be expected to have a significant impact on the city of Bandar Lampung. Semangko Fault is a geological formation that stretches on the island of Sumatra from north to south, starting from Acehto Teluk Semangka in Lampung. This fault forms the Barisan Mountains, a series of highlands on the west side of the island. Semangko Fault is relatively young and most easily seen in the Sianok Canyon and Anai Valley areas near the City of Bukittinggi.

1. Methodology

2.1 Determination of coordinates The

Determination of coordinates is carried out in the city of Bandar Lampung using Google Earth software. After that calculations are carried out *latitude* and *longitude* at some points in Bandar Lampung city and 42 coordinates are obtained.

2.2 Calculation of VS30

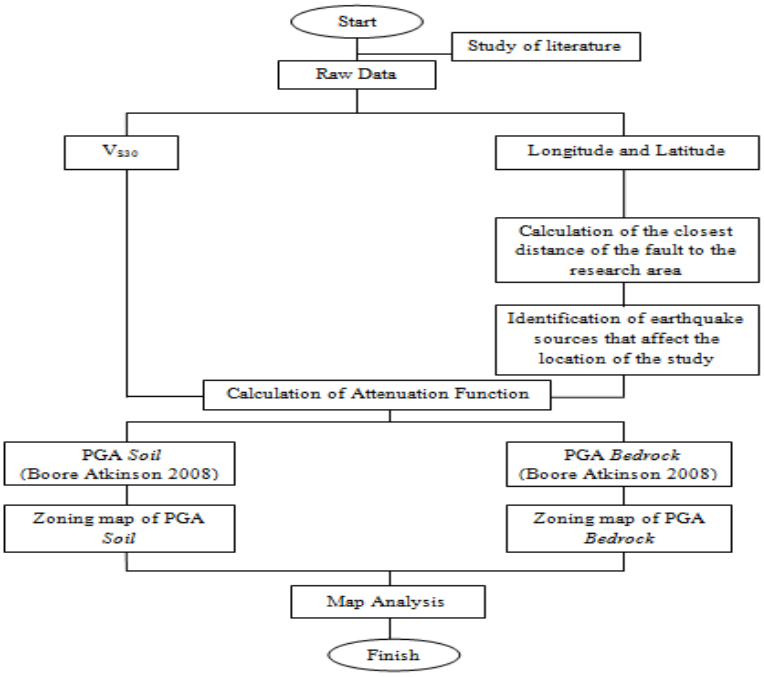
Estimates of Vs30 are obtained from *Multichannel Analysis of Surface Wave* (MASW) data in Bandar Lampung city. The estimation of Vs30 is then used to determine the soil class based on *The NEHRP site classes*.

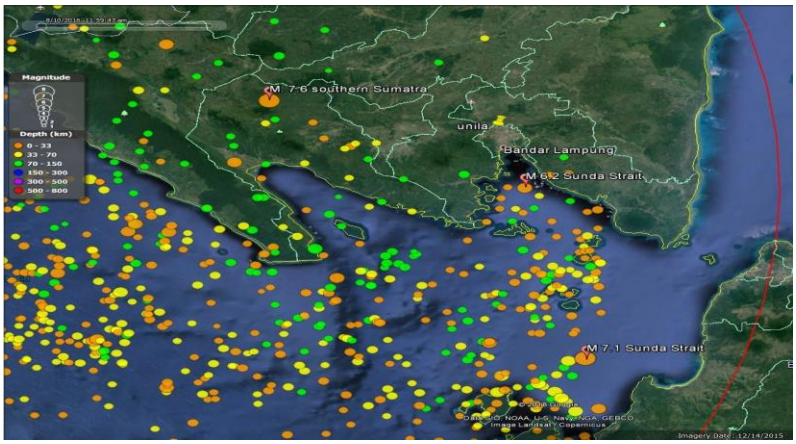
2.3 Deterministic Seismic Hazard Analysis (DSHA)

In general, the DSHA approach method can be divided into 4 stages, namely: identifying earthquake sources that are likely to affect the observation location, determining the scenario of earthquake parameters by selecting the maximum magnitude and the closest location of the earthquake source which is expected to have an impact on the location of the observation, determine the parameters of ground motion at the observation location by using the attenuation

function and determining the parameters of the largest soil movement planned to occur at the observation site. DSHA is done by determining the parameters of ground motion at the observation location using attenuation functions (Irsyam, 2010).

2. Analysis and Discussion





In this study, the location of the Lampung airport was located close to the stamps fault and the Sundanese fault. To determine the effect of the earthquake source, a PGA calculation was performed on each earthquake source for the study location. The following is the PGA value in the stamps fault and sunda fault:

Area	Magnitude	Location		The epicenter to the research location (meters)	G
Kumering Strait	6.2	5.629S	105.322E	72.109.07	0.08509996
Southern Sumatra	7.6	5.226S	104.596E	30.404,56	0.096702953
Sunda Strait	7.1	6.389S	105.480E	117,690.03	0.08509996

From the table, it can be seen that the greatest PGA value is found in semangko faults, this indicates that the stamps fault was the source of the earthquake that affected the Bandar Lampung region.

A. Determining the value of Vs30

After the earthquake source is obtained, then determine the value of Vs30. Vs30 values in the Bandar Lampung region were obtained through the *Multichannel Analysis of Surface Wave* (MASW) data in Bandar Lampung city. The value of vs30 is used to determine the classification of rocks based on the strength of earthquake vibrations due to local effects and is used for purposes in the design of earthquake resistant buildings.

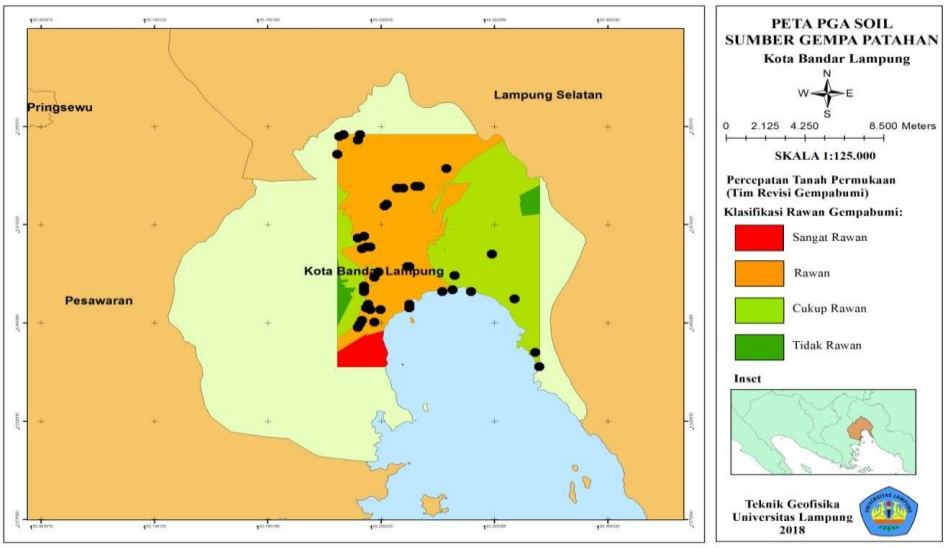
Class Land	General Description	Vs30 (m / s)
A	Rock	hard>1,500
B	Rock	750-1500
C	Land hard, very dense and soft rocks	350-750
D	Land Average	175-350
E	Land Software	<175

Table 3.1 Classification of *Site Class* based NEHRP (FEMA 302, 1997).

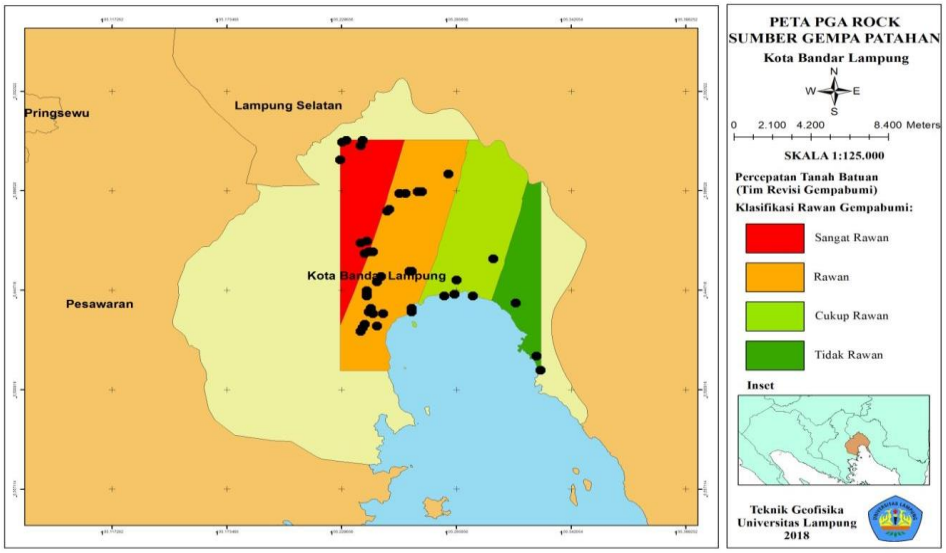
In the city of Bandar Lampung the value of Vs30 ranged from 47.3 m / s to 800 m / s, this indicates that the city of Bandar Lampung has a class of land class B, C, D and E where the soil class cannot continue seismic waves due to the type of soil in this rock is soft rock.

B. Analysis of the DSHA Method

Analysis of the potential earthquake risk in the Bandar Lampung region is done using the Deterministic Seismic Hazard Analysis (DSHA) method where the results obtained are in the form of Peak Ground Acceleration in the bedrock layer and soil layer. This PGA value is obtained from the calculation of the attenuation function.



Based on attenuation calculations using the Boore-Atkinson equation (2008) the PGA values in the bedrock layer ranged from 0.0605g-0.0755g and the PGA values for soil layers ranged from 0.06g-0.18g. From the PGA calculation by entering the value of Vs30 it can be concluded that if Vs30 is large, the resulting PGA value will be smaller and vice versa. On the zoning map of the bedrock layer, it can be seen that the PGA value of 0.073g is a very vulnerable zone located in the upper west direction. While on the zoning map in the soil layer, it can be seen that the PGA value of 0.19g is a very vulnerable zone.



4. Conclution

In Bandar Lampung City the Vs30 value produced ranges from 180 m/s to 760 m/s, this indicates that Bandar Lampung City has class C, D and E soil classifications which describe medium and hard land. The bedrock PGA values ranged from 0.060700g-0.075259g

while the PGA values in soil ranged from 0.063771g-0.189448g. The deterministic method gives a picture of the relationship between the strength of the earthquake and the distance of the earthquake source. Areas that are closer to the rupture area will have a PGA value greater than the area farther away from the rupture area and the PGA value can also be affected by the type of soil.

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