The Second International Conference on Sustainable Future for Human Security (SustaiN'2011)

The 186th Symposium on Sustainable Humanosphere

Kihada Hall | Uji Campus | Kyoto University

8 - 10 October, 2011

Organized by

PPI Kyoto | PPI Kansai

Co-hosted by : **Supported by :**

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Indonesian Student Association (ISA) Kyoto
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Kyoto University
Global Center of Excellence on Energy Science, Kyoto University
Center for Southeast Asian Studies, Kyoto University
Global Center of Excellence on Human Security Engineering, Kyoto University
Research Institute of Sustainable Humanosphere, Kyoto University

INTRODUCTION

We are living in an important historical point. The rise of Asia had brought waves of optimism across Asian nations. This brings many opportunities to shape a sustainable future for human security in Asia. However, there are still many problems and challenges lie in various aspects and levels, from community to governance, from politics to economy, and from global to local.

The shift of pendulum generated some consequences; some of them lead to natural resources depletion, shortage of carbon based energy, shortage of food and water, as well as over-utilization of natural and human resources. The future economic and technology heavily rely on either the proper utilization of Asian natural resources, or well-prepared human resources.

To create breakthroughs for ensuring the prosperous future of the Asian people, deep understanding of problems and the dynamics shaping them is at paramount importance. Thus, students and scholars are at the forefront of this process.

Learning from the advanced West is important. However, it is clear that “one size fits all” is not always applicable. Asia, with its unique and vibrant culture, history, and socio-political contexts, offers various different kinds of wisdom and solutions. It depends on us to answer this intellectual challenge. Thus, we believe that building a network of students and scholars working on various aspects and levels of challenges for the future of Asia with various academic backgrounds is an important step to find creative and fresh answers.

However, scholarly understanding of challenges and their creative answers to problems should not stop at books, journals, and conferences. They should inspire policies and actions, both by the government and civil society. We should create bridges to bring ideas to realities.

Therefore, to answer above some mentioned issues, an international annual conference 2010 was carried out by the Indonesian Student Association (ISA) in Kyoto, Japan. Regarding related issues and its effort to continue provide international gathering, this year ISA continue and organize this event entitled ‘The 2nd International Conference on Sustainable Future for Human Security’ (SUSTAIN 2011).

One of the continuing challenges for the sustainable welfare of Asian people is its disaster-prone characteristics such as Indonesia and Japan. The both countries are located in the Pacific Ring of Fire, making earthquakes, tsunamis, and volcano eruptions frequently happen. Apart from the natural disasters, complex social, cultural, and political situations in various Asian countries offer a wide range of possibilities for man-made disasters such as violent conflicts.

When disasters happen, all aspects of life disrupted: families killed or wounded, homes and health facilities destroyed, economic activities stopped, trauma widespread. Furthermore, compared to instant casualties caused by the disaster itself, the slow and unsustainable recovery often claims more victims.

Disaster prevention and recovery efforts without good governance and clear strategies waste resources, both intentionally (e.g. prone to corruption) or unintentionally (e.g. ineffective allocation, cultural gap problems, etc.). Thus, given this disaster-prone characteristic, a comprehensive strategic policy for directing disaster prevention and post-disaster recovery efforts is at paramount importance for Asian countries.

Who are stakeholders appointed to govern disaster prevention and post disaster recovery? In our recent approach of public administration, namely good/democratic governance, multi stakeholders have to govern it. Each stakeholder must have different position and role in governing disaster prevention and recovery system. If the stakeholders can work together by using the principles of good governance, the disaster prevention and recovery system will work optimally to prevent, to save, and to recover the society.

Therefore, sharing Indonesian and Japanese experiences in disaster prevention and recovery governance is really important in order to find any problem of governing the disaster prevention and recovery system. At the same time, it is to create a formulation of good 'disaster prevention and recovery' governance. Furthermore, the workshop is a vehicle of bearing a network among the stake holders namely government, NGOs, and academia from both countries who concern on disaster management. In the future, the network is expected growing up to help and initiate any immediate action in disaster management in Indonesia-Japan. The constructive impact globally is that the network will become a good model of disaster management network for others country in the world.

Based on the background, SUSTAIN 2011 of PPI Kyoto will undertake a workshop to facilitate a focused discussion of multi stakeholders from Indonesia and Japan. The workshop is **SUSTAIN 2011's Integrated Workshop on Sustainable Post-Disaster Recovery**.

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Special thankful to Embassy of the Republic of Indonesia-Japan, Consulate General of the Republic of Indonesia in Osaka, Central Bank of Indonesia, and Garuda Indonesia for supporting this conference.

Kyoto, November 2011

Yulianto P Prihatmaji
Chairman

SUSTAIN 2011
PARALLEL SESSION PROGRAM

ROOM: ANOA

Saturday, 8 October 2011			
<<Parallel Session 1>> Moderator:Asst. Prof. Khoirul Anwar			
13.00 - 13.20	20'	EnE-008	ENHANCEMENT OF PHOTOCATALYTIC HYDROGEN PRODUCTION UNDER UV LIGHT IRRADIATION OVER MESOPOROUS-ASSEMBLE TIO_2-ZRO_2 MIXED OXIDE NANOCYSTAL PHOTOCATALYSTS *SurakerkOnsuratoom, SumaethChavadej, Satoshi Horikoshi, and Masahiko Abe*
13.20 - 13.40	20'	EnE-009	EFFICIENCY IMPROVEMENTS OF PHOTOVOLTAIC PANELS USING DUAL AXIS SUN-TRACKING SYSTEM BASED ON ASTRONOMIC SUN POSITION IN EQUATOR ZONE *Ivan Triyadi, FebriArwan, Jihad Furqani, and BilawalAulia*
13.40 - 14.00	20'	EnE-066	INCREASING THE EFFICIENCY OF SOLAR PANEL USING LOW POWER AND LOW COST MAXIMUM POWER POINT TRACKER IN ORDER TO EXPAND THE USE OF SOLAR PANEL IN INDONESIA *AgusPradityaTampubolonandIGedeSuryanaSaptawirawan*
14.00 - 14.20	20'	EnE-064	EVALUATION OF THE LOCATIONS FOR SMALL WIND TURBINES IN URBAN AREAS BASED ON WIND ENVIRONMENT MAP *Chun-Ming Hsieh, Chuan-Kang Fu and Meng-ShenKan*
14.20 - 14.40	20'	EnE-011	STORAGE REQUIREMENT FOR A ZERO EMISSION RENEWABLE SYSTEM IN JAPAN *Miguel Esteban, Qi Zhang,N. AgyaUtama and Keiichi N. Ishihara*
14.40 - 15.00	20'	EnE-005	OPTIMIZING UTILIZATION OF COAL BED METHANE (CBM) AS A NATURAL RENEWABLE ENERGY RESOURCE FOR GREEN COAL ENERGY RESOURCHES IN INDONESIA *ArioAriefIswandhani*
15.00 - 15.20	20'	EnE-061	FUTURE NATURAL GAS PRICE PREDICTION IN INDONESIA USING NETBACK MARKET VALUE METHOD *Erwin Gitarisyana, AthikomBangviwat, JaruwanChontanawat, and DjoniBustan*
15.20 - 15.40	20'	Coffee Break	

<<Parallel Session 2 >> **Moderator:Asst. Prof. Miguel Esteban**			
15.40 - 16.00	20'	EnE-014	SMART MICRO WIND TURBINE “TSD 500” PERFORMANCE EVALUATION AT KEJAWANAN CIREBON BEACH, INDONESIA *Akbari and GedeSuryanaSaptawirawan*
16.00 - 16.20	20'	EnE-039	METHANE EMISSION IN GAJAH MUNGKUR DAM *Amalia Prima Putri*
16.20 - 16.40	20'	EnE-021	EFFECTS OF ACETOSOLV PULPING VARIABLES ON PULP AND PAPER PROPERTIES OF OIL PALM FROND FIBRES ACETOSOLV PULP *Nasrullah R. C. L., W. D. Wan Rosli And I. Mazlan*
16.40 - 17.00	20'	EnE-010	MITIGATION OF EMISSIONS THROUGH FUEL ECONOMY STANDARDS FOR PASSENGER CARS *T.M.I. Mahlia and S. Silitonga*
17.00 - 17.20	20'	EnE-048	RELATIONSHIP BETWEEN CHEMICAL COMPONENTS OF WOOD AND THEIR SUGAR RELEASED *Fitria, N. Sri Hartati, WahyuDwianto, DanangSudarwoko Adi1, Rumi Kaida, and Takahisha Hayashi*
17.20 - 17.40	20'	EnE-049	STUDY OF FUNGUS (MELANOTUS SP.) AND FUNGUS (PHANEROCHAETE CHRYSOSPORIUM) AS ENVIRONMENTALLY FRIENDLY BIO-DELIGNIFICATION IN THE PULPING PROCESS *RizqahWahidahPangestu, Muhammad FachrielJeddawi, and MawardiKartasasmita*
17.40 - 18.00	20'	EnE-022	INDUSTRIAL SYMBIOSIS IN THE ENERGY SECTOR TO SUPPORT INDUSTRIAL ESTATE SUSTAINABILITY IN INDONESIA *Ahmad Mubin*

SUSTAIN 2011
PARALLEL SESSION PROGRAM

ROOM: BADAK

Saturday, 8 October 2011			
<<Parallel Session 1>> **Moderator:Yusup N. K. H.**			
13.00 - 13.20	20'	NH-003	CODE RIVER CAPACITY ANALYSIS FOR LAVA MATERIAL AT THE POST ERUPTION OF MERAPI VOLCANO IN 2010 *WidodoBrontowiyono, RibutLupyanto, and NurEvi O.*
13.20 - 13.40	20'	NH-007	ARSENATE ADSORPTION MECHANISM ON NANO-BALL ALLOPHANE *Elvis AnupShukla, Naoto Matsue, and TeruoHenmi*
13.40 - 14.00	20'	NH-008	PROBABILISTIC SEISMIC HAZARD ANALYSIS (PSHA) OF YOGYAKARTA CITY WITH THREE DIMENSIONAL SEISMIC SOURCE MODEL *Abdul Rochim*
14.00 - 14.20	20'	NH-011	A TIME-LAGGED ENSEMBLE SIMULATION ON THE MODULATION OF PRECIPITATION OVER WEST JAVA IN JANUARY-FEBRUARY 2007 *Nurjanna J. Trilaksono, Shigenori Otsuka, and Shigeo Yoden*
14.20 - 14.40	20'	NH-017	FACTORS OF ATTITUDE, SUBJECTIVE NORMS, RISK PERCEPTION, CRITICAL AWARENESS AND PAST EXPERIENCES IN INFLUENCING FLOOD PREPAREDNESS BEHAVIOR *WignyoAdiyoso, Hidehiko Kanegae and ChaweewanDenpaiboon*
14.40 - 15.00	20'	NH-002	SAA PAPER PULP WASTEWATER TREATMENT BY OZONATION *JitthepPrasityousil and NuchonkanPhrommathep*
15.00 - 15.20	20'	NH-016	USING GARBAGE ENZYME FROM ORGANIC WASTE AS REPLACEMENT FERTILIZER *Diyah Kristi Ningrum*
15.20 - 15.40	20'	Coffee Break	
<<Parallel Session 2 >> **Moderator:Nurjanna J. Trilaksono / Syafwina**			
15.40 - 16.00	20'	NH-013	THE RESEARCH OF PRECAUTION AND RESCUE MECHANISM WHILE FACING SERIOUS DISASTERS IN TAIWAN *Yi-Chun Lin and Yung-Nane Yang*

16.00 - 16.20	20'	NH-015	FLOW CHARACTERISTICS IN SEMI OPEN EMBAYMENT *EkaOktariyantoNugroho and Akihiro Tominaga*
16.20 - 16.40	20'	NH-014	AN ASSESSMENT OF TRMM DAILY RAINFALL: DRIVING TO DECREASE SUSCEPTIBILITY IMPACT ON SOIL EROSION *PonthipLimlahapun and Hiromichi Fukui*
16.40 - 17.00	20'	NH-010	A STUDY OF SPATIAL FEATURES OF COMPOUND DISASTERS - A CASE STUDY IN TAINAN CITY, TAIWAN *Juei-Hsuan Wang and Hsueh-Sheng Chang*
17.00 - 17.20	20'	NH-022	LEARNING FROM YOGYAKARTA EARTHQUAKE EXPERIENCE: TOWARDS URBAN EARTHQUAKE-RESISTANT DESIGN GUIDELINES *Catharina DwiAstutiDepari*
17.20 - 17.40	20'	NH-018	USING THE CONCEPT OF STICKY POLICY FOR FILLING THE GAP IN COMMUNITY-SELF DISASTER INFORMATION MANAGEMENT *PenpathuPakdeeburee, SiyaneeHirunsalee And Hidehiko Kanegae*
17.40 - 18.00	20'		

PROBABILISTIC SEISMIC HAZARD ANALYSIS (PSHA) OF YOGYAKARTA CITY WITH THREE DIMENSIONAL SEISMIC SOURCE MODEL

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ABSTRACT

This study presents seismic hazard analysis that aims to estimate peak base acceleration of Yogyakarta for 500 – year return period earthquake. The seismic hazard analysis by probabilistic seismic hazard analysis (PSHA) method using EZ FRISK program that models fault sources in three dimensional representation. The seismic sources considered are the acknowledge earthquake potential to a depth of 200 km within radius of 500 km from Yogyakarta. This study utilizes logic tree to cover uncertainties within one method of earthquake assessment. Seismic parameters are calculated by the method of Kijko & Sellevoll and Weichert. Three attenuation models are chosen for determination of the ground motion. The attenuation model of Youngs is selected to represent the subduction environment of Java and attenuation models of Boore et al. and Sadigh et al. are selected to represent shallow crustal fault. The result of the analysis shows that its peak base acceleration is 0.33 g for 500 – year return period.

Keywords: Probabilistic seismic hazard analysis, peak base acceleration, ground motion, three dimensional seismic source

INTRODUCTION

According to its seismo-tectonical condition, Indonesia is a country that is much suffered from earthquakes. The records of earthquakes hitting this country in last 15 years have been representing how much it is risky to damage due to earthquake. A large number of devastating quakes have striken, such as the Aceh earthquake that triggered the catastrophic tsunami, Padang earthquake, and Yogyakarta one. For this reason, the analysis of seismic hazard must be inserted in a building design.

This seismic hazard analysis was conducted using Probabilistic Seismic Hazard Analysis (PSHA) method since this was quite flexible to estimate ground motion probability in earthquake prone areas having seismic sources that clearly or not measured (Frankel, A, 1998). The result of PSHA was a seismic hazard curve that displayed a probability of exceedence as a function of ground motion. The first estimation of seismic hazard using this method was conducted by Cornell (1968). In addition, the building codes dominantly occupied by American had been using seismic zone maps based on PSHA in which represented the seismic hazard (Leyendecker et al., 1995). Several recent researches also exhibited to use PSHA and it was believed that the method was still used in the future. In the previous years, the analysis of seismic hazard was used to having two dimensional analysis to design earthquake-resistant buildings. Indonesian seismic codes was still based on the same two dimensional analysis in which this method was done to simplify the desirable calculation in which the effect of seismic source geometrical shape that was real three dimension could be minimized. As to the development of knowledge and technology, a three dimensional analysis of seismic hazard could be easily conducted. Therefore, a three dimensional seismic source model should be considered as the best way to represent the real condition on the field and have an accurate estimation.

The objectives of this research were: 1) to estimate the peak base acceleration (PBA) of Yogyakarta for 200, 500, and 1000 year return period earthquake using a seismic source model in three dimensional representation, attenuation functions, and a suitable logic tree with a help of EZ Frisk version 7.2 program. 2) to develop the response spectra of bed rock of Yogyakarta as a picture of seismic wave in it. 3) to describe an accurate and sophisticated seismic hazard analysis by explaining the calculation with respect to used analysis.

Some restrictions in this research are 1) the seismic sources considered were the acknowledged earthquake potential to a depth of 200 km within radius of 500 km from Yogyakarta. 2) the acceleration was produced by utilizing a logic tree. 3) only accelerations of the year return period earthquake of 200, 500, and 1000 years were estimated.

METHODOLOGY

Seismic Data.

Seismic data occupied, the hypocenters, were from both Indonesian and International geological boards such as Indonesian Meteological and Geophysical Board (BMG), United Stated Geological Survey (USGS), International Seismological Center (ISC), and Preliminary Determination of Epicenter (PDE). The seismic sources considered were the earthquake potential to a depth of 200 km within radius of 500 km from Yogyakarta from February 1903 to July 2007.

Processing Seismic Data. Based on Firmansjah (1999), the correlation betweeen Ms and mb, and Ms and Mw, for only earthquakes occured in Indonesia, were created.

$$Ms = 1.33\ mb - 1.98 \qquad (1)$$

$$Mw = 1.10\ Ms - 0.64 \qquad (2)$$

Separating between Mainshocks and Aftershocks.

Among empirical criteria to identify foreshocks such as Arabasz & Robinson (1976), Gardner & Knopoff (1974), Uhrhammer (1986) dan Firmansjah (1999), in this research the Uhrhammer was occupied.Completeness of Seismic Data Catalog. According to Stepp, J.C. (1972), seismic rate (λ) was defined as the number of earthquakes (N) recorded during a period (T) being devided by the period (T). Standard deviation of rate (σ) was defined as the square root of rate (λ) devided by the period (T).

A seismic rate was assumed to be constant only for long period observation. The period in which rate (σ) was observed started to break and steeper than the previous one denoted seismic data were no longer homogenous.

Characterizing Seismic Data.

Identifying and evaluating seismic source were done based on geological and seismological data. Knowledge on the tectonic condition, and the history of geological and seismic data was required to identify seismic sources. In this stage, seismic source zone was created. To calculate the seismic parameters in the zones needed a prior modelling used to obtain hypocenter distributions in which the dip of each subduction zone observed was estimated. The seismic sources considered are the acknowledged earthquake potential to a depth of 200 km.When determining a maximum magnitude for each seismic source zone, a maximum magnitude in the areas can be determined geophysically from plate / tectonic structure. A maximum magnitude (Mw) can be a function of seismic moment (Mo), combined with the Kanamori formula (1977).

$$Mo = \mu.A.d \qquad (3)$$

$$Mw = (\log Mo/1.5) - 10.7 \qquad (4)$$

While the maximum magnitudes for subduction zone from tectonic structure by Mulyadi, 1999, were used that were Megathrust zone = 8.2 and Benioff zone = 7.2, the ones for strike slip zone by Irsyam, 1999 were used that were Sukabumi fault = 7.6, Bumiayu fault = 6.7, and Yogyakarta fault = 6.3.

Seismic Hazard and Rate Recurrence Parameters.

Seismic hazard analysis using probabilistic method required a-b parameters to determine the rate recurrence. The two common models in PSHA were Gutenberg-Richter (G-R) (1944) and characteristic earthquake models.

$$\log N(m) = a - bm \qquad (2.7)$$

$$\ln N(m) = \alpha - \beta m \qquad (2.8)$$

with $\alpha = 2.303a$, $\beta = 2.303b$.
Several methods of G-R model development used to obtain a-b parameters were Least Square (1954), Weichert (1983), dan Kijko & Sellevol (1989). Attenuation Function. Considering the research that has been done by LAPI-ITB (2000) on attenuation functions with a slight standard error, this research occupied several of them, that was, Youngs (1997) to represent subduction mechanism, Boore et al. (1997) and Sadigh et al. (1997) to represent strike slip (shallow crustal).

Logic Tree.

A probabilistic calculation enabled systematic uncertainties of a parameter in seismic hazard model. In many cases, the best method for determining parameters in a model was not absolutely clear. However, using a logic tree (Figure 1) could minimize the uncertainties in a model. A logic tree approachness gave a chance to use an alternative model in which each alternative was given a weighted factor. Hence this could be a good model that provide suitable value.

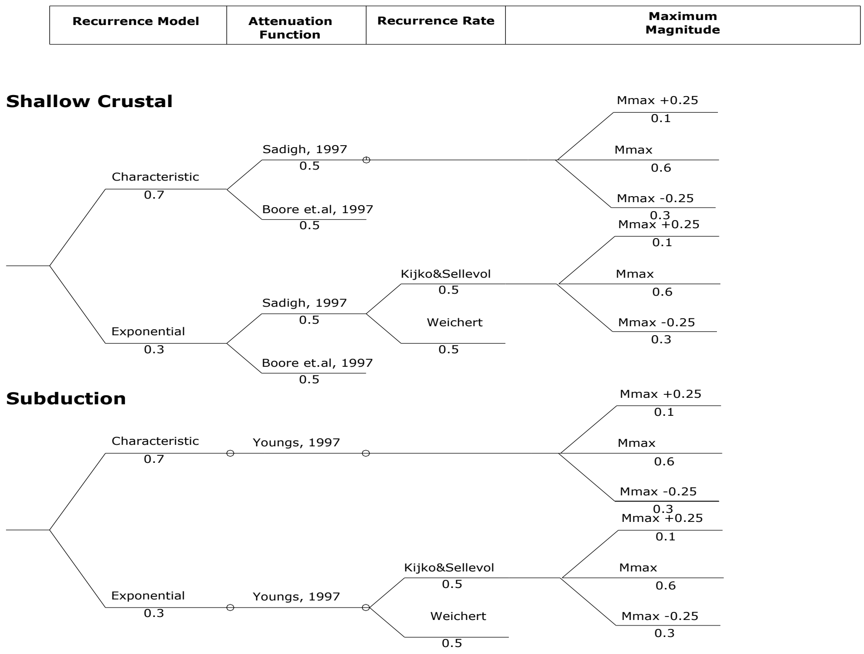

Figure 1 Logic Tree for seismic hazard analysis

Seismic Hazard Analysis.

A method that was sophisticated to analyze seismic hazard using probability concept was probabilistic seismic hazard analysis (PSHA). This method ensured that the uncertainties from magnitudes, locations, and rate of recurrence of earthquakes were explicitly taken into account in seismic hazard evaluation. This analysis was conducted with a help of EZ-FRISK version 7.2 program from Risk Engineering, which represented seismic sources in three dimension. Peak base acceleration (PBA) was the result of this program.

RESULT AND DISCUSSION

Processing seismic data was conducted in a sequence. First, converting the magnitude scale based on the Firmansjah formula (1999), then separating main shocks and aftershocks using empirical criteria from Uhrhammer (1986), and finally estimating the completeness of seismic data based on the Stepp method (1973). The analysis result demonstrated that earthquake data with magnitudes (M) more than 7.0 were completed for last 103 years. However, the magnitudes in the range of 6.0 – 7.0

and the magnitudes in the range of 5.0 - 6.0 were completed only for last 40 years (Figure 2 - 3).

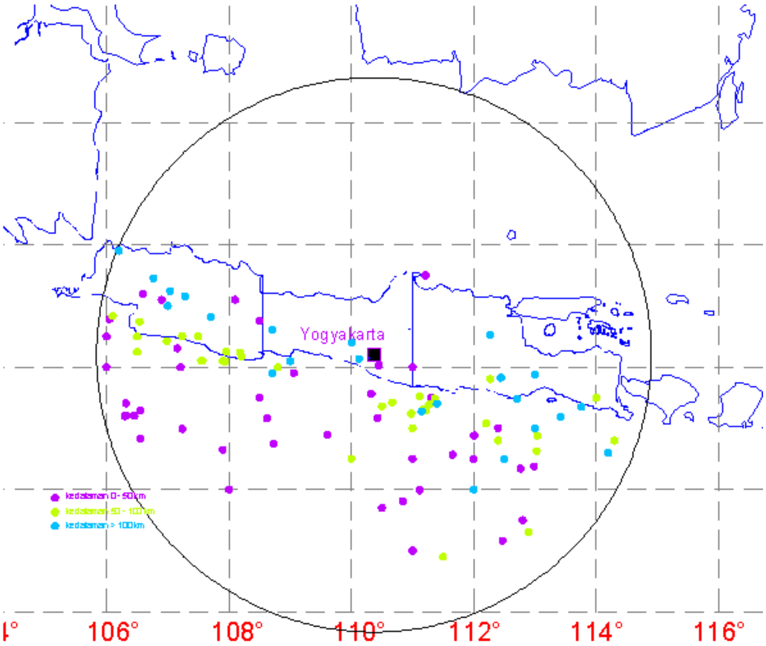

Figure 2 Mainshocks

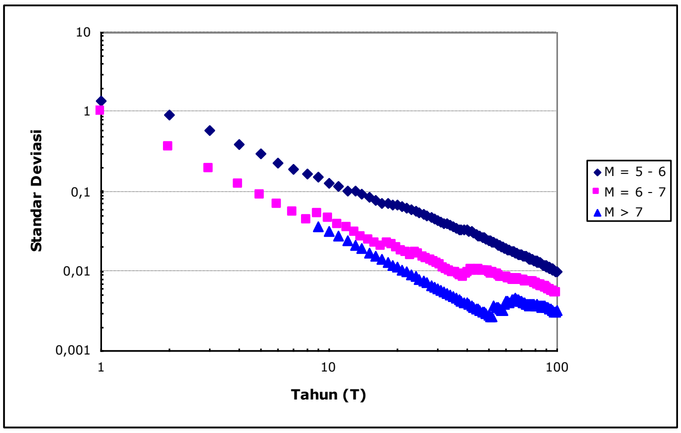

Figure 3 Time of completeness of seismic data catalog

The seismic sources considered in this research were the acknowledged earthquakes potential to a depth of 200 km within radius of 500 km from Semarang, and moment magnitudes higher than 5.0 in which consisted of Java's subduction and shallow crustal seismic sources as shown in Figure 4. While Java's subduction to a depth of 50 km was modeled as interface or megathrust seismic source (2-1a, 2-2a, 2-3a), subduction in a depth more than 50 km was modeled as intraslab or benioff seismic sources (2-1b, 2-2b, 2-3b). Shallow earthquakes to a depth of 50 km but outside of subduction areas were considered as shallow crustal quakes. These Java's faults such as Sukabumi, Bumiayu, Baribis, Semarang, Lasem, and Yogyakarta faults were rested in an average depth of 25 km. In this study, the seismic source model was based on the Indonesian seismic source map by Firmansyah and Irsyam (1999) and Kertapati (1999) as shown in Figure 4.

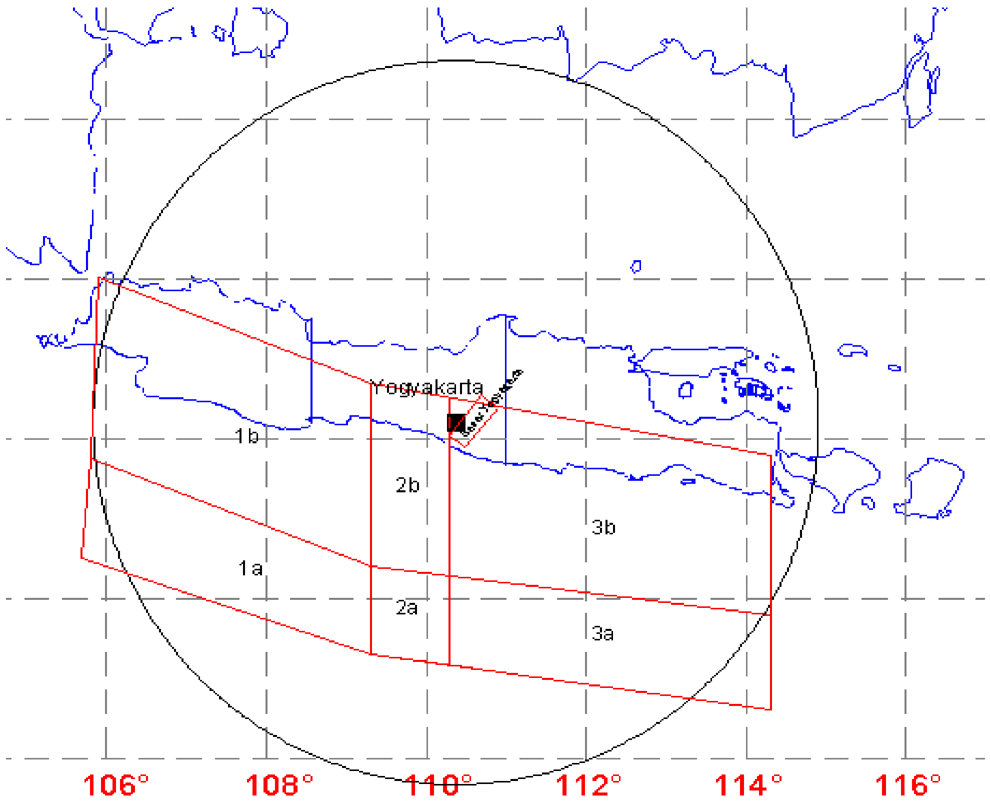

Figure 4 Model of seismic source area

The hypocenter profiles in each seismic zone could be seen in Figure 5 – 7. In these southern – nothern side view, shallow crustal hypocenters have been separated from subduction ones. It could be noticed that the number of quakes in sub zone 2-2 were a bit less than those of other zones. This demonstrated that the seismicity of central Java was lower than that of both western and eastern sides.

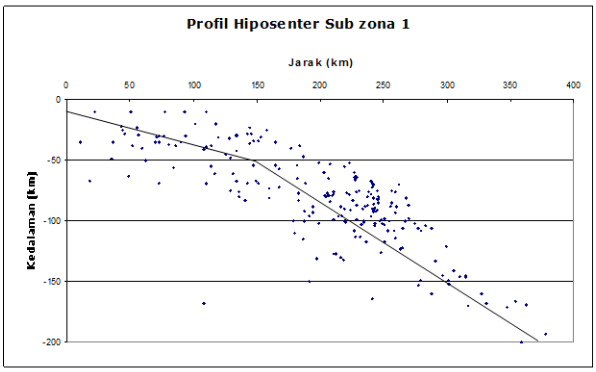

Figure 5 Hypocenter profile of sub zone

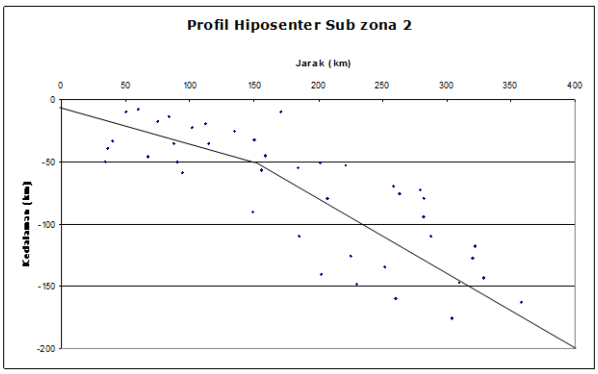

Figure 6 Hypocenter profile of sub zone

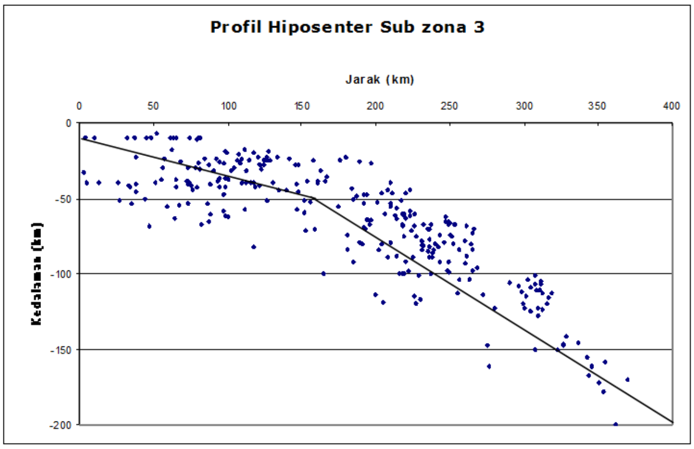

Figure 7 Hypocenter profil of sub zone 2-3

The seismic hazard analysis using probabilistic method required a-b parameters to determine seismic rate based on Guyenberg-Richter equation log N(m) = a – b.M. Least square , Weichert (1980), and Kijko & Sellevol (1989) models have been chosen to calcúlate the a-b parameters. Interface seismic sources in Java were united to obtain stable a-b parameters and seismic rates, so did the intraslab and shallow crustal seismic sources. Seismic parameter values for each seismic zone used in this research could be seen in Tabel 1. The values of a and b are used in Bounded Gutenberg-Richter Law (Arabaz & Robinson, 1990) to calcúlate annual exceedance frequency. While the máximum magnitudes for subduction zones refer to the tectonic approach by Mulyadi, 1999, that is, 8.2 and 7.2 for Megathrust zone and Benioff zone respectively, the one for strike slip zone refers to USGS, which has the value 6.3. the relationships between frequency and magnitude in subduction zone are shown in Figure 8-9.

Tabel 1 Seismic parameters according to Weichert and Kijko & Sellevol method

	Weichert's method					Kijko & Sellevol's method				
Zone	**a - value**	**b - value**	**Beta**	**Rate**	**Alokasi**	**a - value**	**b - value**	**Beta**	**Rate**	**Alokasi**
Jawa Interface :	4.247	0.91	2.095	0.498	1.00	4.606	0.97	2.234	0.570	1.00
1a	3.929	0.91	2.095	0.239	0.481	4.288	0.97	2.234	0.274	0.481
2a	2.834	0.91	2.095	0.019	0.039	3.192	0.97	2.234	0.022	0.039
3a	3.929	0.91	2.095	0.239	0.480	4.287	0.97	2.234	0.274	0.480
Jawa Intraslab :	4.851	0.96	2.211	1.125	1.000	5.153	1.02	2.349	1.130	1.000
1b	4.441	0.96	2.211	0.437	0.389	4.743	1.02	2.349	0.439	0.389
2b	4.074	0.96	2.211	0.188	0.167	4.376	1.02	2.349	0.189	0.167
3b	4.499	0.96	2.211	0.500	0.444	4.801	1.02	2.349	0.502	0.444
Shallow Crustal :										
Sesar Yogyakarta	4.039	1.00	2.307	0.109	0.308	3.308	0.99	2.320	0.000	0.308

Based on the a-b parameter values, maximum magnitudes from each source, and the logic tree as the inputs of seismic hazard analysis, PBA's and uniform hazard spectra (UHS) curves of Yogyakarta for 200, 500, and 1000 year return period earthquake could be produced (Table 2 and Figure 10 – 11).

Tabel 2 Yogyakarta's PBA values for several return periods

PBA of Yogyakarta city (g)		
200 years	500 years	1000 years
0.26	0.33	0.38

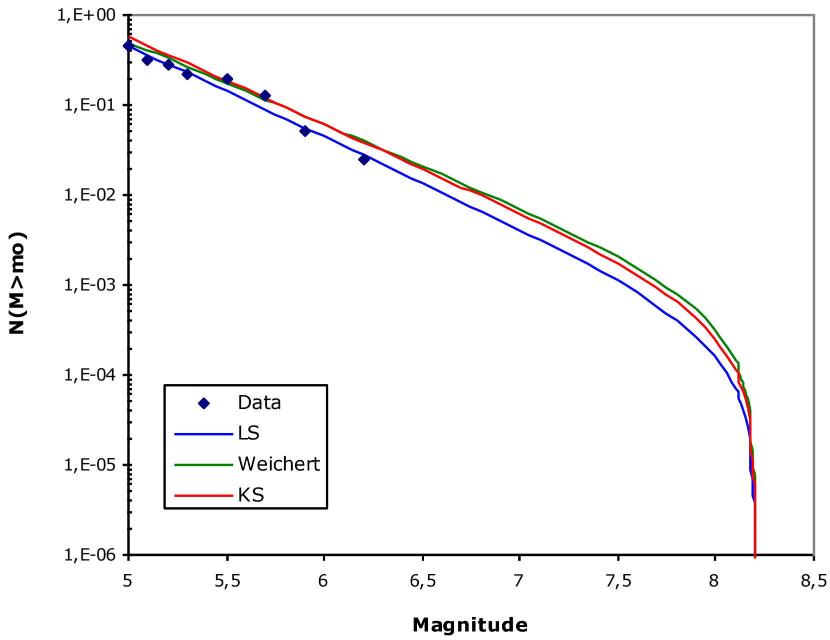

Figure 8 Annual rate of exceedance in subduction zone of *interface* in Java

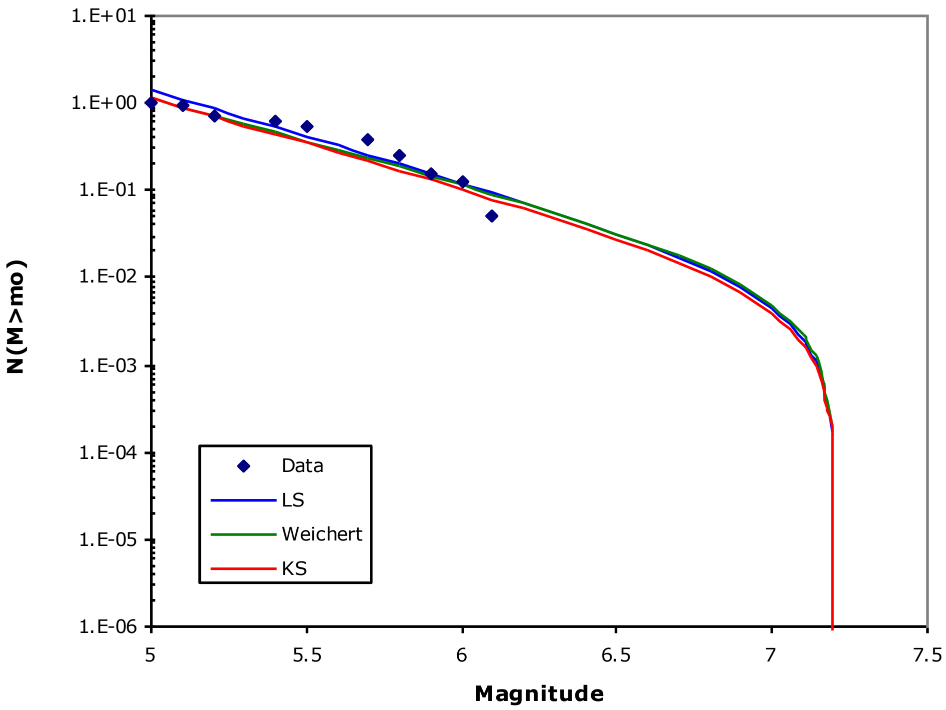

Figure 9 Annual rate of exceedance in subduction zone of *intraslab* in Java

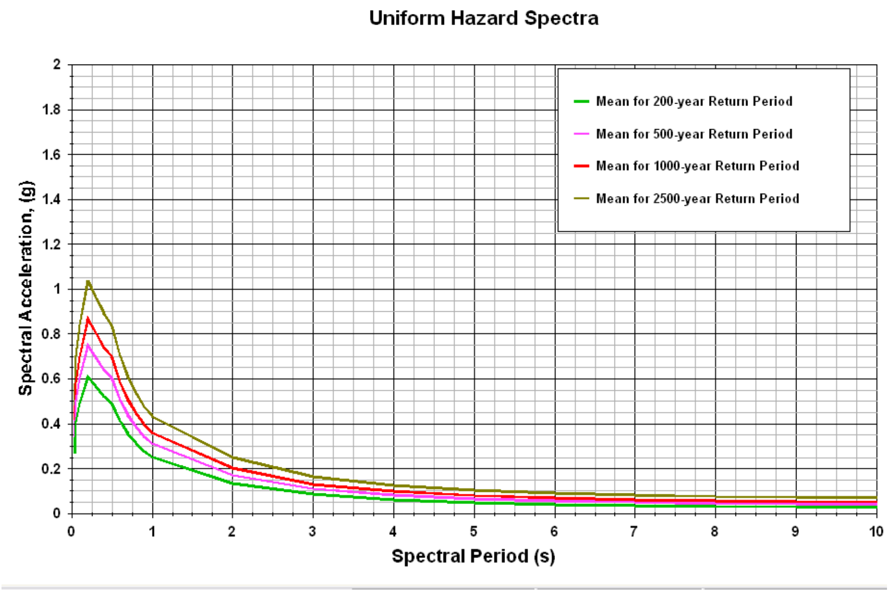

Figure 10 Uniform Hazard Spectra (UHS) for several return periods

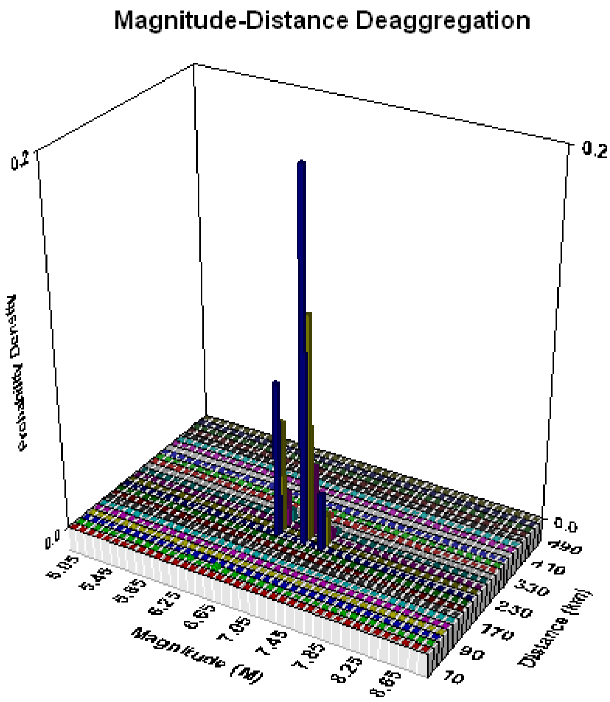

Figure 11 Deagregation on T = 0 second

It could be shown from deagregation result that seismic hazard of Yogyakarta was dominated by intraslab seismic source with the mean magnitude and distance were 7.05 and 203 km respectively.

CONCLUSION

1. The analysis result demonstrated that earthquake data with magnitudes (M) more than 7.0 were completed for last 103 years. However, the magnitudes in the range of 5.0 – 7.0 were completed only for last 40 years
2. It could be shown from deagregation result that seismic hazard of Semarang was dominated by intraslab seismic source, which is strong and rare earthquakes with the mean magnitude and distance were 7.03 and 203 km respectively.
3. Spectral Accelerations in UHS (Uniform Hazard Spectra) for return period of 500 are: for T 0 second = 0.330 g, T 0.2 second = 0.75 g, dan T 1 sec = 0.310 sec.

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