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Fourth International Conference on Sustainable Built Environment

PROCEEDING

The 4th International Conference on Sustainable Built Environment

"Sustainable Bulding and Environment for Sophisticated Life"

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The 4th International Conference on Sustainable Built and Environment

Sustainable Building and Environment for Sophisticated Life

October 12-14, 2016

Yogyakarta

ISSN 2541-223X

Welcome Speech

The Dean - Faculty of Civil Engineering and Planning, Universitas Islam Indonesia

Assalamu'alaikum warrahmatullahi wabarakatuh
The honorable:

- Rector of UII, Dr. Harsoyo,
- Conference Partners: University of Hawai'i at Manoa – USA, Univesity of Rhode Island – USA, Hokkaido University – Japan, University of Rhode Island (URI), - USA, National Cheng Kung University – Taiwan, PT. Waskita Sangir Energi, Persatuan Insinyur Indonesia (PII) and Intakindo
- Keynote speakers: Prof. Dolores Foley, Prof. Thomas Boving, Prof. Masahiko Fujii, Prof. Tsair Fuh Lin, Mr. Ibnu Sina and Mr. Surahman
- Participants of the 4th ICSBE 2016
- Distinguished Guests, ladies and gentlemen,

First of all, praise be to Allah, the Cherisher and Sustainer of the world, for His blessing for all of us. He who has provided us a chance so that we could be here to share knowledge, ideas, solutions and experiences in the Fourth International Conference on Sustainable Built Environment (ICSBE) 2016. To the academicians, our colleagues from overseas universities, guests, participants, students and so on, please accept our gratitude, warm welcome and appreciation.

The sustainability of green infrastructure and environment is a common thing to be realized without compromising the ability of future generation. It must be done to prevent any adverseimpacts on our lives such as air and water pollution, land use and contamination, material depletion, impacts on human health, and climate change. Therefore, it is expected that the incorporation of sustainable development concept in terms of research, product, and values will enhance the energy performance of environment development and bring about building sustainability as well as disaster management. The needs should merge with the improvement of global development to create a sophisticated life.

The Fourth International Conference on Sustainable Built Environment (ICSBE) 2014 takes issues in this urgent agenda of **Sustainable Building and Environment for Sophisticated Life**". The conference plays role as the media to share wisdom and experiences, and develop knowledge as well as skill and recent technologies on the applicationof built environmental sciences and technologies.

Let me deeply express a special appreciation to the speakers: Prof. Dolores - University of Hawai'i at Manoa, USA, Prof. Thomas Boving – University of Rhode Island (URI), USA, Prof. Masahiko Fujii - Hokkaido University, Japan, Prof. Lin – Cheng Kung University, Taiwan, Mr. Surachman-PT. WaskitaSangir Energy, Mr. IbnuSina- Major of Banjarmasin. Our appreciation is also for all the participants who have actively written excellent research papers.

Finally, my special thanks go to the Rector of UII, all the steering and organizing committees for making this conference possible. It is desired to have a sustainable conference to be continuously held in the future times, as we are challenged to make a sustainable building and environment for a sophisticated life.

Wassalamu'alaikum warrahmatullahi wabarakatuh

Yogyakarta, October 12, 2016
Faculty of Civil Engineering and Planning (FCEP), Universitas Islam Indonesia
Dr.-Ing. WidodoBrontowiyono.
The Dean

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Welcome Speech

The Rector - Universitas Islam Indonesia

The Honorable:

- Dean of Faculty of Civil Engineering and Planning Universitas Islam Indonesia, Dr. –Ing. Ir. Widodo, M.Sc
- All the keynote speakers of this conference: Prof. Dolores Foley (from University of Hawaii at Manoa, USA), Prof. Thomas Boving (from University of Rhode Island, USA), Prof. Tsair Fuh Lin (from National Cheng Kung, Taiwan), Ibnu Sina S.Pi., M.Si., (as a Mayor of Banjarmasin), Prof. Masahiko Fujii (from Hokkaido University), Ir. Surachman, M.Tech. (Director of PT. Waskita Sangir Energi)
- Distinguished participants, ladies, and gentlemen

Assalamu'alaikum Warahmatullahi Wabarakatuh,

On this special occasion, let me invite you to praise Allah SWT for His mercy and grace that we are able to attend the 4th International Conference on Sustainable Built Environment (ICSBE) today.

On behalf of the university, I warmly welcome you, all the impressive keynote speakers and participants. Welcome to Universitas Islam Indonesia, the oldest national university in the country.

Distinguished guests, ladies, and gentlemen,

In September 2015, The United Nations (UN) held The UN Development Summit that formally adopted the agreement "Transforming our World: The 2030 Agenda for Sustainable Development". The summit embraced the three dimensions of sustainability, such us economic, social and environment. The summit also aimed at ending global poverty and building a life of dignity for all. That was a generally accepted concept of Sustainable Development Goals (SDGs) in the world. The report of the 1987 World Environment and Development Committee argues that "Sustainable development is development that meets the needs of prevention without compromising the ability of future generations to meet their own needs".

Three dimensions of sustainable development which consist of society, economy and environment should exist together. Economic development should not depend on excessive resource consumption; meanwhile, environmental sustainable development should be considered more important. This 4th ICSBE 2016 is conducted to provide the opportunity for government officials, researchers, academicians, industry practitioners, non-governmental and multinational organization staffs and other stakeholders to share their views and experiences to build international collaborative networks on managing sustainable development.

Some important issues that will be presented on this seminar are about how to manage sustainable development through Green Infrastructure, Sustainable Resources Management, and Sustainable City. I do hope that this conference will inspire us to enhance our awareness to explore any possibilities in involving sustainable development. Also, I look forward to hearing discussions (on these topics) and I hope we can be inspired by the best practices we will hear from our distinguished speakers.

Finally, by reciting "Bismillahirrahmanirrahim" hereby I officially open the event of the 4th International Conference on Sustainable Built Environment (ICSBE). May Allah always guide us and lighten our step.

Thank you.

Wassalamu'alaikum*Warahmatullahi Wabarakatuh.*

Yogyakarta, October 12-14, 2016

Dr. Harsoyo

Rector

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Preface

Dear Readers and Participants,

The 4th International Conference on Sustainable Built Environment (ICSBE), held in Yogyakarta on October 12-14, 2016, is biannual international conference organized by the Faculty of Civil Engineering and Planning, Islamic University of Indonesia (UII), Yogyakarta since 2010. The conference is aimed at nurturing the study, comprehension, and appreciation of the built environment.

The conference is intended to provide a forum for exchanging of ideas, sharing of knowledge, and dissemination of information on the study of the built environment from different parts of the world. It seeks to further develop regional and international network of academicians, professionals, and policy makers on the management of the built environment.

The first ICSBE was held in May 2010 in Yogyakarta, with the theme 'Enhancing Disaster Prevention and Mitigation', which attracted participants from 8 countries, who presented 74 selected papers. In response to the interests of the participants, the second was held in July 2012 with the theme "Livable Cities in Fast Growing Cities" and the third was held in October 2014 by theme "Resilience and Risk Reduction towards Well-being Society." There were more than 150 abstracts submitted and presented in the conference from several countries such as Indonesia, Malaysia, Philippine, Turkey, Thailand, USA, etc. Since the 4th ICSBE, ISSN (International Standard of Serial Number) is used instead of ISBN because the conference is organized regularly once in two years. In order to improve the quality of ICSBE, we select excellent papers and submit to international journal indexed by scopus (selected papers only).

The fourth ICSBE is supported by Hokkaido University, Japan, University of Hawaii at Manoa, USA, University of Rhode Island, USA, National Cheng Kung University, Taiwan, Government of Banjarmasin, PT. Waskita Sangir Energy, PII and Intakindo.

The theme of 4th ICSBE 2016 is **Sustainable Building and Environment for Sophisticated Life** and the sub-themes are: **Green Infrastructure, Sustainable Resources Management, Sustainable City and Special Issues on Disaster management.**

The 4th ICSBE is attended by worldwide participants such as Indonesia, Malaysia, Philippines, Thailand, India, Bangladesh, Australia, USA, Japan, Taiwan, etc. More than 140 abstracts and full papers were submitted and about 95 papers were selected to be presented during the conference.

Finally, on behalf of the organizing committee and organizing institution, we would like to deliver our gratitude to the participants and various parties for their financial support, especially to the Ministry of Research, Technology and Higher Education (RISTEK DIKTI).

Eko Siswoyo, Ph.D
Chairman of 4th ICSBE

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Conference Organization

Organizing institutions
Universitas Islam Indonesia, Indonesia
Hokkaido University, Japan
University of Rhode Island (URI), USA
National Cheng Kung University, Taiwan
University Hawaii at Manoa, USA

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EDITORIAL

Nowadays, green infrastructure has been flourishing extensively worldwide so as to improve the quality of life. As what is seen from the conference, there are countless number of presented papers focused on this issue.. The widely studied green material to develop construction by covering the variation of filler on the building and pavement, the usage of wood, fiber usage, GGBS and slag in concrete, etc is one of the examples of such studies on green infrastructure. In addition, some studies also address the aspect of methodology, by aiming to shed light on design and assessments of green infrastructure.

Besides green infrastructure, the management of sustainable resources also has considerable significance to preserve the wellness of the earth. There were 35 papers written about the result of the optimization of some management methods for environmentally friendly surroundings with few papers aimed to focus on the aspect of assessment. Some of the papers presented the result of the management of waste, reservoir, raw water, and standard operating procedure. Hence, the material to support the management was also discussed from several types of chemicals particularly.

Those researches were expected to create sustainable city in some parts of the world extending from Some issues such as sustainable housing development and the activities that support sustainable city have been presented in this conference. Moreover, some breakthrough concepts to create a green city have also been developed such as sustainable transport system, climate change mitigation, and sustainable city planning. Altogether were expected to succeed the sustainable building and environment for sophisticated life.

Furthermore, there was also a theme of disaster management since Indonesia is renowned as prone to disaster areas and that many other parts of the world are also experiencing the same thing. These researches extend from disaster preparedness and the application of some tools for disaster resilience, and the disaster simulation to find the worst possible effect which may take place. These researches proposed people sense of belonging of the disaster and mitigation in areas of disaster. Lastly, the evaluations for all of which were conducted to know the best strategy to manage the disaster.

During discussion in the plenary session, some questions such as how to prevent and minimize the impact of disaster, what should be done to deal with crisis of energy, what is the most suitable water treatment technology in Indonesia and what will Kalimantan do to protect rivers were addresed to the keynote speakers. Answering these questions, Professor Dolores mentioned that people in Indonesia should get an insight and understanding on the potency of natural hazard in their area. Professor Fujii said that Indonesia should consider about microhydro energy for power plant. Furthermore, Mr. Surachman suggested that biomass energy will provide us with huge benefit because the sources were abundant in this country. Prof. Boving from Rhode Island University who was totally familiar with the condtion in Indonesia proposed the filtration system for water supply. In the parallel session, the discusion was well organized by each moderator in four different rooms based on each topic. The participant from Thailand was interested on the development of bioadsorbent prepared from tofu waste in Indonesia. Questions such as what was the recent condition about green infrastructure in Indonesia, the impact of rapid land use change, the potencial energy sources, etc were discussed extensively.

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ANALYSIS OF COMMUNITY CAPACITY INDICATORS AND DISASTER PREPAREDNESS USING STRUCTURAL EQUATION MODELING

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ABSTRACT

The geographical condition of Indonesia is an archipelagic country, the meeting of four tectonic plates and many volcanoes has caused a high potential for natural disasters. A regional disaster risk involves three aspects: hazard, vulnerability and capacity. By increasing the capacity of disaster mitigation, the risk of disaster can be reduced. The increase of the capacity is done in order to improve the readiness of the governments/organizations, communities and individuals in facing the disaster. This study examined some aspects relating to the disaster mitigation capacity. The disaster mitigation capacity includes aspects of social, economic and physical environment. While the preparedness aspect discussed was the readiness of the individual and community preparedness. The readiness of individuals was affected by the knowledge and attitude, while the readiness of the communities was affected by their leadership, information and facilities. By using Structural Equation Modeling (SEM) analysis, it has proven that the link between the Community's capacity and preparedness for natural disasters. The community's capacity includes the Social aspects, Physical / Environmental and Economic aspects. Preparedness consists of preparedness of individual and community preparedness. Individual preparedness plan includes aspects, knowledge and attitudes. Community preparedness includes leadership, information, facilities.

Keywords: Capacity; Hazard; Mitigation; Structural Equation Modeling; Vulnerability.

1. INTRODUCTION

Indonesia is a country that has a high potential for natural disasters. Indonesian territory is a confluence of four tectonic plates, namely Australian continent plates, the continent of Asia, the Pacific and the Indian Ocean plate. This condition makes the emergence of fire mountain ranges along the south coast of the island of Sumatra, Java, and the Banda Islands, as well as the emergence of centers of earthquake. With these characteristics, Indonesia has potential and proneness to disasters such as the eruption, earthquakes, tsunamis, volcanoes, floods and landslides. In conducting disaster mitigation, disaster risk assessment of the region is the first step needed. In calculating the risk of a regional disaster three aspects are involved: hazard, vulnerability and capacity of a region that is

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based on the characteristics of the physical condition and territory. Risk is proportional to vulnerabilities and threats, and inversely proportional to the mitigation capacity. Disaster risk can be reduced if mitigation capacity (resilience, preparedness) disaster from the public increased. Therefore, to reduce the risk of disaster, it can be done by raising awareness and building the capacity of disaster mitigation. The increased capacity regarding the mitigation of social, cultural, and technical need to be undertaken simultaneously.

BNPB has set Rule No. 4 of 2008 on guidelines for disaster management plans. BNPB has also devised a scoring guide regional capacity in disaster management in Rule No. 03 of 2012. These laws emphasize the regional capacity of aspects of the policy aspect, preparedness, and the role of institutions. The degree of readiness of a region to anticipate the impact of the disaster will vary from one region to another. The institutional factor is one among many factors that can determine the readiness of a region to anticipate the impact of disasters. Many researchers have conducted research on improving the capacity of a region in the face of disaster. Yulianto et al (2012) proposed the use of data Synthetic Aperture Radar (SAR) for risk reduction and disaster mitigation. Compilation of the adaptive capacity of community's vulnerable areas of drinking water and sanitation-related impacts of climate change has been done by Yuda (2013). Measuring tool to determine the ability of individuals, households and communities in the face of disaster has not been done. This instrument is very important, because it can be used as a basis for evaluation whether the efforts to increase the readiness of the region have been successful.

This paper discusses the factors that affect the capacity and readiness of communities in disaster mitigation. Capacity of mitigation is concerning aspects of socio-cultural, economic, and physical-environmental. While the preparedness aspect discussed was the readiness of the individual and community preparedness. The readiness of individuals is affected by the knowledge and wisdom/attitude, while the readiness of the community is affected by the program, networking, leadership, and facilities. Data analysis was performed using analysis Structural Equation Modeling (SEM).

2. DISASTER PREPAREDNESS

BNPB in Regulation No. 03 of 2012 has defined the following terms:

a. Disaster is an event or series of events that threaten and disrupt the lives and livelihood caused by both natural factors and / or non-natural or human factors that lead to the emergence of human lives, environmental damage, loss of property, and psychological impact.
b. Preparedness is a series of activities as part of efforts to eliminate and / or reduce the threat of disaster.
c. Capacity is the ability of regions and communities to take action to reduce the threat and potential disaster losses in a structured, planned and integrated way.

Yohe and Tol (2002) proposed a method for developing indicators of social and economic capacity in the context of climate change. A simple index for measuring the capacity of adaptation has used by Ionescu et al. (2009) including GDB, the literacy rates, and the rate of female labor force participation. Yohe et al. (2006) used a Vulnerability-Resilience Indicator Prototype (VRIP) which has been developed by Brenkert and Malone (2005) to calculate the index by considering the adaptive capacity of adaptation to the changing environment. Iglesias et al. (2009) has developed

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Adaptive Capacity Index (index AC) using three main components; the ability of the economy, civil and human resources, and agricultural innovation. The same approach has also been carried out in the context of drought (Moneo, 2007). In other scheme, Iglesias et al (2011) has developed an index of social vulnerability to drought. Steps measurement vulnerability index are: (i) select the variables that contribute to vulnerability, (ii) normalize variables, (iii) combine the sub-components of the variables within each category of vulnerabilities with a weighted average, and (iv) measure vulnerability as average weighted components.

BNPB Regulation No. 03 of 2012 defines five priority disaster mitigation rules:

a. Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation.
b. Identify, assess and monitor disaster risks and enhance early warning systems to reduce the risk of disaster.
c. The realization of the use of knowledge, innovation and education for capacity building and secure a culture of disaster at all level.
d. Reduce the risk factors .
e. Strengthen disaster preparedness for effective response at all level.

Yuda (2013) has compiled an index of adaptive capacity of regional communities vulnerable to water by using three variables: (1) Individual preparedness described in the aspect of knowledge perception and behavior, (2) community readiness described into aspects of local wisdom, leadership, involvement and presence organization. (3) Institutional readiness described in aspects of the network consists of information and policies. Community preparedness is a process or series of activities as part of efforts to eliminate and/or reduce the threat of disaster with several stages. Community readiness model is made to see the public response policy interventions / programs (Yuda, 2013). The models incorporate five (5) community readiness dimensions, namely: (a) an anticipatory effort through policy; (b) public awareness of the policy; (c) Leadership; (d) understanding of the problem; and (e) funding for anticipatory effort (in the form of money, time, land, etc.). Capacity is a combination of the capabilities and characteristics of the individual, community, or organization, which is used to achieve certain goals. Capacity is the ability to take action to reduce the threat and potential disaster losses in a structured, planned and integrated way.

3. SEM ANALYSIS PROCEDURE

SEM is used instead of designing a theory. It is rather intendedly used to examine and justify a model. Therefore, the main requirement using the SEM is the hypothetical model that consists of the structural model in the form of a diagram of the path that is based on the theory. SEM is a set of statistical techniques that allow the testing of a series of relationships simultaneously. The relationship is built between one or more independent variables. SEM analysis includes three phases, namely the conceptualization of models, preparation of flow diagrams and specification model (Ghozali, 2008). Conceptualization stage of the model is related to the development of hypotheses (based on the theory) as a basis for linking the latent variables to other latent variables and indicator variables. Drafting stage flowcharts (path diagram contruction) will facilitate the visualization of the proposed hypotheses in the conceptualization of the model above. The specification models stage is the step of determining the number and nature of the parameters to be estimated. According to Hair et al (1998), there are 7

(seven) main stages that must be done in using the technique with SEM analysis in a research activity that is:

a. Theoretical Model Development
b. Development Flowchart
c. Conversion flowcharts into equation
d. Selecting input matrix and estimates the corresponding model
e. Identification of possible problems
f. Evaluation Criteria Goodness of fit
g. Interpretation and Modification Model.

4. INDICATORS OF CAPACITY AND COMMUNITY PREPAREDNESS

The capacity is strongly influenced by economic, social, physical and environmental factors. There are two aspects of community preparedness, i.e. readiness of individual and readiness of community. Readiness of individuals is affected by factors of knowledge and attitude, while the community readiness is influenced by factors Program, Network, Leadership, Local Knowledge and Facilities.

a. Knowledge (A). Knowledge factor consists of knowledge of disaster in general (A1), Knowledge of saving themselves from disaster (A2), experience in a training / seminar / simulation disaster preparedness (A3), experience of natural disasters (A4), Knowledge of residence which is the area hazard (A5), and family Knowledge on natural disasters (A6).
b. Plan of Action (C). Plan of action factor consists of a set of decisions about how to protect and rescue people and property from disaster.
c. Local Wisdom / Manners (D). Local wisdom/manner consists of Perception (D1) and Motivation (D2).
d. Leadership and Program (E). Leadership and program factor consists of efforts by the local government in improving disaster preparedness (E1), the Party responsible for disaster preparedness (E2), Efforts by the local government in disaster risk reduction (E3), approach to disaster management (E4), and government efforts in disaster early warning (E5).
e. Information (F). Information factors consist of media's role in disaster preparedness (F1), sources of information and media (F2).
f. Facility (G). Facility factor consist of the evacuation route and early warning equipment/services.

Variable capacity consists of physical / environmental, social and economy.

a. Physical / environmental (H) consists of the physical location house (H1) and type of house (H2).
b. Social (J) consists of the length of stay (J1) and education (J2).
c. Economy (K) consists of the ownership of goods (K1), major Work (K2), assets owned in case of disaster (K3).

The concept of capacity and readiness of the community described in Figure 1 will be tested using SEM analysis.

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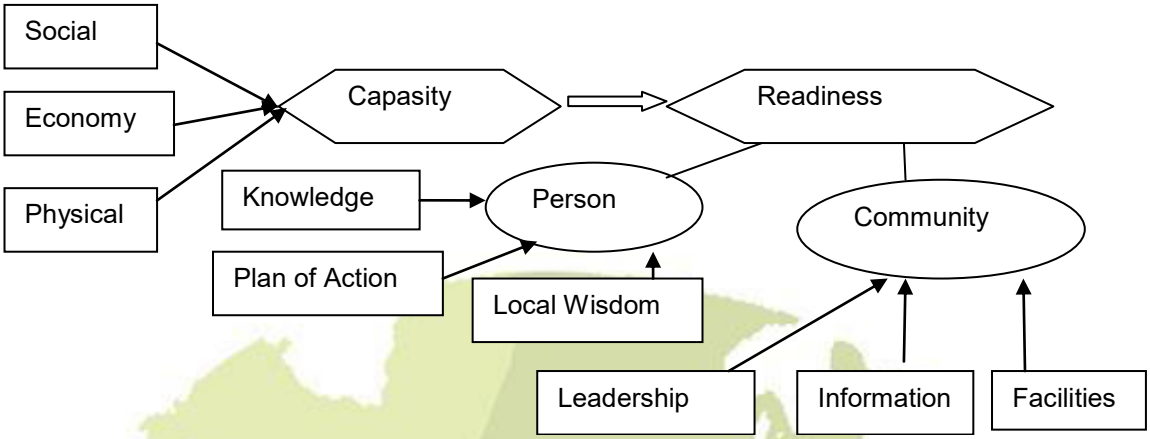

Figure 1 The concept of capacity and society preparedness

The concept of capacity and readiness of the community described in Figure 1 will be tested using SEM analysis. In the pilot phase models, data taken on some areas that represent the type of potential disasters such as floods, earthquakes, landslides, droughts and volcanoes.

5. SURVEY RESULTS AND DISCUSSION

For the purposes of testing the truth of a concept that has been poured in the points questionnaires, the survey was conducted and the data obtained as many as 198 respondents from 114 districts in 28 provinces across Indonesia. Distributions of the number of respondents who have experienced natural disasters are presented in Figure 2. The types of natural disaster in question are (1) Earthquakes, (2) Flood, (3) Extreme Weather, (4) Drought, (5) Tsunami, (6) Landslides, (7) Volcano eruption, (8) Sea waves, (9) Land and Forest fires.

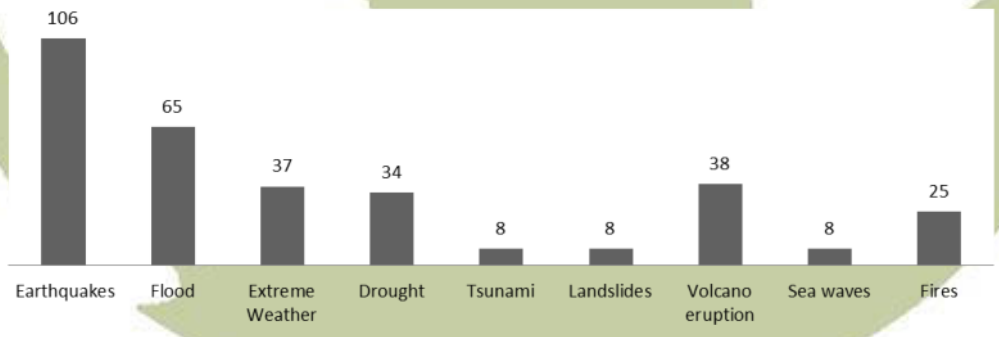

Figure 2 The number of respondents is based on the experience of disaster events.

The questions specifically related to attitudes have been tested for the validity and reliability. From the test results it can be concluded that such questions are valid and reliable. Results of Reliability Test are presented in Table 1.

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Table 1. Results of Test Reliability

Indicators	Number of Items	Cronbach's Alpha
Local Wisdom (Perception and Motivation)	8	0.829
Self-rescue plan	13	0.745
Disaster preparedness	9	0.887
Efforts to reduce disaster risk	4	0.794
Disaster management	3	0.891
Sources of information and media 1	4	0.708
Sources of information and media 2	7	0.849

Observation of each factor is presented in Table 2. Each variable has a value in between 1 to 10. Based on the data in Table 2, it is showed that the average knowledge variable (A1 to A6) is still very low; between 1.224 to 3.249. More than 75% of respondents value the variables A3, A4 and A5 of less than 3,thus, the majority of respondents feel the experience in a training / seminar / simulation disaster preparedness, natural disasters experience, and knowledge of the dwellings are disaster-prone areas (A5) is minimal. The respondents' assessment of the variable C, D1, E4, F2, H1, H2, J showed that over 75% of respondents provide an assessment of more than 7.5. It can be concluded that:

a. the respondents have made well preparations to secure valuables and preparation of rescue plans from disaster,
b. the respondents have the good perception to disasters that they do not complain, do not despair,
c. the respondents argued that the disaster mitigation is important,
d. the respondents are satisfied with the role / involvement of the mass media in providing information to improve the citizen preparedness for natural disasters.

Table 2 Results of observation on each variable

Variable	Mean	Minimum	Q1	Median	Q3	Maximum
A1	3.249	0.000	1.667	2.778	4.722	10.000
A2	3.192	0.000	1.111	2.222	5.000	10.000
A3	1.320	0.000	0.000	0.000	1.667	10.000
A4	1.882	0.000	1.429	1.429	2.500	8.572
A5	1.224	0.000	0.000	1.111	2.222	7.778
A6	2.112	0.000	1.000	2.000	3.000	10.000
C	7.397	4.039	6.654	7.308	8.077	10.000
D1	8.409	2.917	7.500	8.333	9.167	10.000
D2	7.152	1.538	6.154	6.923	8.462	10.000
E1	5.649	1.923	4.704	5.577	6.352	9.039
E2	5.926	0.000	2.500	5.000	10.000	10.000
E3	6.325	2.000	6.000	6.000	7.000	9.500
E4	8.846	3.333	7.500	9.167	10.000	10.000
E5	4.873	0.000	2.500	5.000	7.500	10.000
F1	5.232	0.000	3.929	5.714	6.429	10.000
F2	8.153	3.636	7.500	8.159	8.864	10.000
G	4.315	0.000	0.000	3.333	6.667	10.000
H1	8.159	4.167	7.500	8.333	9.167	9.167
H2	9.305	3.333	8.333	10.000	10.000	10.000
H3	5.766	0.000	5.000	6.000	7.000	10.000
J1	9.109	2.500	8.250	10.000	10.000	10.000
J2	8.051	2.500	7.500	7.500	10.000	10.000
K1	5.766	0.000	5.000	6.000	7.000	10.000

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Variable	Mean	Minimum	Q1	Median	Q3	Maximum
K2	1.782	0.000	1.000	1.000	2.000	10.000
K3	6.168	3.333	4.444	5.556	7.778	10.000

Based on the concept in Figure 1, SEM model was composed as presented in Figure 3 using Amos 20 software:

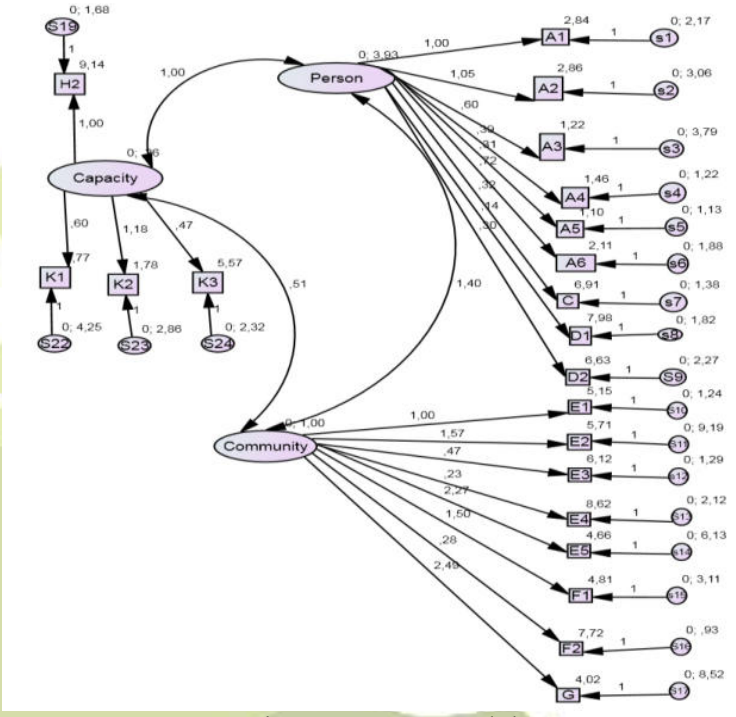

Figure 5 SEM Model

Due to the limited number of sample the preparedness variable could not be included in the model (Figure 5). There are three latent variables; community, capacity, person. The estimated values of the parameter and statistic test on each path are presented in Table 5. As the P-value <0.05, it can be concluded that all parameter is significant at α = 0.05 means that the indicators could explain the latent variables (factors): capacity, individual and society.

Table 5 Parameter Estimation

Path			Estimate	S.E.	Z.	P-Value
A1	<---	Person	1.000			
A2	<---	Person	1.055	.094	11.258	***
A3	<---	Person	.605	.084	7.241	***
A4	<---	Person	.388	.049	7.975	***
A5	<---	Person	.313	.045	6.931	***
A6	<---	Person	.718	.069	10.447	***
C	<---	Person	.320	.049	6.487	***
D1	<---	Person	.141	.053	2.672	.008
D2	<---	Person	.304	.061	4.978	***
K1	<---	Capacity	.604	.292	2.068	.039
K2	<---	Capacity	1.177	.265	4.443	***
K3	<---	Capacity	.469	.217	2.166	.030
E1	<---	Community	1.000			

Path			Estimate	S.E.	Z.	P-Value
E2	<---	Community	1.570	.282	5.576	***
E3	<---	Community	.469	.100	4.694	***
E4	<---	Community	.233	.117	1.992	.046
E5	<---	Community	2.274	.293	7.759	***
F1	<---	Community	1.502	.200	7.503	***
F2	<---	Community	.278	.080	3.462	***
G	<---	Community	2.493	.332	7.515	***
H2	<---	Capacity	1.000			

Correlation values between the latent variables are as follows:

a. The correlation between the community and person factor of 0.705
b. Correlation between person and capacity of 0.999
c. The correlation between the community and the capacity factor of 0.999 in which correlation of the three variables is quite high. It means that the variable person capacity is affected by capacity and community variable

6. CONCLUSIONS AND RECOMMENDATIONS.

By using SEM analysis, it is proven the link between the Community's capacity and preparedness for natural disasters. Community's capacity included Social aspects, Physical / Environmental and Economic aspects. Preparedness consists of preparedness of individual and community preparedness. Individual preparedness plan includes knowledge and attitude aspects. Community preparedness includes leadership aspects, information aspects, and facilities aspects.

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8. REFERENCES

BNPB Regulation No. 03 Year 2012 on capacity assessment guidelines in disaster areas.

BNPB Regulation No. 4 of 2008 on set guidelines for preparing disaster management plans.

Brenkert, A., and *Malone*, E. (2005) Modelling vulnerability and resilience to climate change: A case study of India and Indian States. *Climatic Change*, 72(1-2): 57-102.

Ghozali, I. (2008). *Model Persamaan Structural: Konsep dan aplikasi dengan program AMOS 16.0*. Semarang: Badan Penerbit Universitas Diponegoro.

Hair,JR.JosephF., Anderson,Rolph E.,Tatham, Ronald L.and Black, William.C. 1998. *Multivariat Data Analysis*. Prentice-Hall International, Inc.

Ionescu, C., Klein, R. J. T., Hinkel, J., Kumar, K.S.K., & Klein, R. (2009). Towards a formal framework of vulnerability to climate change. *Environmental Modelling and Assessment*, *14*, 1-16.

Iglesias, A., Moneo M.,and Quiroga, S. (2009). Methods for evaluating social vulnerability to drought. In A. Igleasias., A. Cancelliere., D. A. Wilhite., L.

ISSN 2541-223X

Garrote., & F. Cubillo (Eds), *Coping with drought risk in agriculture and water supply systems*, pp. 153 -159.

Iglesias A., Mougou, R., Moneo, M., and Quiroga, S, (2011). Towards adaptation of agriculture to climate change in the Mediterranian.*Regional Environmental Change, 11*,159-166.

Moneo, M., (2007) "*Agricultural vulnerability of drought: A comparative study in Morocco and* Spain", MSc Thesis, IAMZ-CIHEAM, Zaragoza.

Yohe, G., and Tol, R.S.J. (2002), Indicators for social and economic coping capacity: Moving toward a working definition of adaptive capacity. *Global Environmental Change*, *12*, 25-40.

Yohe, G., Malone, E., Brenkert, A., Schlesinger, M., Meij, H. dan Xing, X., (2006), "Global Distributions of Vulnerability to Climate Change" *Integrated Assessment Journal*, 6 (3): 35-44.

Yuda (2013), "Mitigasi dan adaptasi perubahan iklim oleh masyarakat dalam ketersediaan air minum. *Laporan Penelitian*. Jakarta: Dinas Pekerjaan Umum.

Yulianto, F., Parwati, A., & Zubaidah., (2012). Penguatan kapasitas daerah dalam pemanfaatan data *Synthetic Aperture Radar (Sar)* untuk pengurangan resiko dan mitigasi bencana. *Laporan Penelitian*. Jakarta: LAPAN**.**