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## **The Mapping of Disaster Readiness of SSB (The Disaster Ready Schools) in The Coastal Area of Padang City, Indonesia**

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### **Abstract**

The purpose of this research was to identify the level of readiness of SSB (the Disaster Ready Schools) in the coastal area of Padang City especially in the red zone area in facing the disaster, especially earthquake and tsunami. Some variables of SSB are: the school community knowledge about the disaster, the disaster response skills, the school policies/SOP, the emergency response plans, and the resource mobilization. This research was descriptive research using observation, interviews and questionnaires in data collection. The data were analyzed using the percentage formula to determine the tendency of respondents. The research population was the SSB in the red zone area. The samples were determined by using purposive sampling technique to choose the schools and proportional random sampling technique to choose the respondents. The results of the research are: 1). the school community knowledge about the disaster tends to be good (3.1), 2). the disaster response skills tend to be good (3.2). 3). not all schools have the good school policies/SOP, 4). In general, no schools have the emergency response plans/the resource mobilization. Based on the calculation of the indicators achievement level, it can be concluded that the readiness of SSB in the coastal area of Padang City especially in the red zone area in facing the disaster is still low. It is proved by only a limited number of SSB that have good readiness. The research recommends: a need of serious disaster mitigation efforts on the part of policy makers. The efforts must be done according to program and continuously. In the attempts given, a variety of innovative activities should be done, such as doing the socialization and disaster response simulation periodically, the celebration of the disaster day, the celebration of the earth day, the celebration of the environmental day, and the empowerment of community (especially schools community), as well as the provision of facilities and infrastructure.

**Keywords: Disaster Readiness, SSB Schools (The Disaster Ready Schools), and The Red Zone Area**

### **Introduction**

Indonesia is one of the archipelago countries of Southeast Asia region. Indonesia location can be viewed from various angles. Astronomically, Indonesia is located at coordinates  $95^{\circ}$  E- $141^{\circ}$  E and  $6^{\circ}$  N -  $11^{\circ}$  S. Geologically, Indonesia is flanked by three tectonic plates, the Eurasian plate, the Philippine plate (Hasmar, 2013). The tectonic plates are always experiencing shifts and pressures. Besides, Indonesian is also located in the path of the fire ring. With this position, it cannot be denied that the Indonesian region, mainly in the west coast of Sumatra, the southern coast of Java and some parts of East Indonesia are prone to earthquakes, both tectonic and volcanic earthquake, also tsunami.

History notes that since the last 10 years, big earthquakes often happen in Indonesia from Sumatra to Irian resulting in loss of life and property. Two of the big earthquakes are the Aceh earthquake occurred on December 4<sup>th</sup>, 2004. The 9.3 Richter scale earthquake was followed by a tsunami, claimed lives of approximately 290,000 people and 500,000 people evacuated (<http://inatews.bmkg.go.id>). Five years later, on September 30<sup>th</sup>, 2009, a massive earthquake of 7.6 Richter scale with the epicenter in the Mentawai fault exactly at Southwestern of Pariaman ( $00.84^{\circ}$  S,  $99.65^{\circ}$  E) at a depth of 71 km occurred. The result was the loss of life and immense physical building. According to Sudirman Gani, the Head of Kesbangpol & Linmas



West Sumatra Province, in the Lokarya Evaluation of West Sumatra Earthquake Emergency Response (December 22<sup>nd</sup> to 24<sup>th</sup>, 2009) West Sumatra earthquake losses are as follows: 1.195 death, 249.833 heavy and light damaged houses, 2.512 damaged educational facilities, 1.010 damaged government facilities, 2.104 destroyed worships houses, 177 km damaged roads, 4.980 damaged bridges, 25 damaged hotels, also other infrastructures such as irrigation, electricity network, communication network, and water supply facilities.

The earthquakes and tsunamis Indonesia has brought the attention of the world to Indonesia. UNESCO in cooperation with LIPI (the Indonesian Institute of Sciences) conducted a joint study in the form of research, especially in the area along the West coast of Sumatra (Aceh, West Sumatra, and Bengkulu). The research is a form of anticipation to reduce the disaster risks. Indonesian government is not standing still. In 2006, the National Development Planning Agency also cooperated with the National Coordinating Board for Disaster Management (BAKORNAS-PB) with the support of the United Nations Development Programme (UNDP). This cooperation successfully established method or procedure to reduce the risk of disasters in Indonesia. All forms of cooperation in the research resulted in the establishment of Law No. 24 of 2007 on the national disaster management.

To educational institutions, especially schools in disaster-prone areas, the government needs to give special attention. One of which is to provide recommendations for the establishment of SSB (the Disaster Ready Schools). The government then gives credence to UPI Bandung as the center of education for Disaster Mitigation (P2MB). Many things have been done by Padang Government related to preparedness for disasters, especially earthquakes and tsunami. In general, the disaster mitigation efforts have been made, such as building the evacuation path toward the east of Padang City as the safe zone area, doing socialization to the public about how to deal with the earthquake and tsunami, building the shelters along the red zone, and setting up siren alarm as a form Early Warning System (EWS).

Padang City SSB (the Disaster Ready Schools) was started in 2010. According to Patra RD, the Executive Director of Kogami Padang, there are 12 schools which are set up as the pilot project for this program. They are: SDN 18, SDN 23, SDN 28, SDN 52, SMP N 13 SMP N 19, SMP Angkasa, SMP Bunda, SMA Pertiwi 1, SMA N 1, SMK N 5, and SMK N 9. Padang City Government welcomes this program for Padang is one of the most disaster-prone regions in Indonesia. SSB (the Disaster Ready Schools) program in the city of Padang is very desirable. The latest data says that the city of Padang is still potentially affected by an earthquake reaching 9 SR. This conclusion is the result of research collaboration between LIPI with the experts of Geophysics and Institute de Physyque du Globe de Patis (IPGB) and the Earth Observatory Singapore-Nanyang Technological University (EOS-NTU) which signal that there are several points of energy that have the potential for earthquake, precisely on Mentawai fault and around Wharton-Siberut basin.

SSB (the Disaster Ready Schools) program in Padang requires serious attention from various parties. SSB (the Disaster Ready Schools) program evaluation needs to be done on a regular basis to serve as the basis for policy as the anticipation of the disasters. With the evaluation of the program, an overview of disaster preparedness on the extent to which schools (especially in the red zone area) make preparations, so as to reduce the risk of disaster, especially the students and other school communities will be obtained. Many factors are considered to contribute to the achievement of the objectives, such as: 1) the attention of related parties and the government on the province, regency/city, subdistrict, and village level, 2) the involvement from the institutions that handle disasters, such as BNPB (both national and local), 3) the socialization to the public about the disaster, especially in the red zone area, 4) the awareness of SSB (the Disaster Ready Schools) program, 5) the concern from the teachers in SSB (the Disaster Ready Schools) program, 6) the support given by the parents to support the success of SSB (the Disaster Ready Schools) program, 7) the participation of the community around the SSB (the Disaster Ready Schools) program, 8) the attitudes and concerns of students as learners on the implementation of SSB (the Disaster Ready Schools) program, and 9) the physical condition of buildings and availability of equipment to anticipate if the earthquake and tsunami occur. But the focal point in this research is the implementation of SSB (the Disaster Ready Schools)



program indicators and the role of related institutions in implementing the SSB (the Disaster Ready Schools) program. Thus, the research problems can be explained as follows: 1) the level readiness of SSB (the Disaster Ready Schools) program in the red zone area of Padang, 2) the role of relevant institutions in the implementation of SSB (the Disaster Ready Schools) program in order to reduce the risk of disaster in the red zone area, and 3) the sustainability of SSB (the Disaster Ready Schools) program so that the objectives can be achieved.

The world has very high attention to natural disasters, especially the disaster-prone country like Japan, China, the Philippines, the USA, Canada, including Indonesia. The attention is focused on the developing countries because they are considered to give less attention on the issue of disaster mitigation (Inoguchi, 2015). The evidence of this attention is the creation of a global platform entitled Hyogo Framework for Action (HFA) 2005-2015. The activity is in the form of the World Conference on Disaster Reduction held in Kobe, Jepang on 2005. The purpose of the movement is to reduce the risk of natural disasters, both the risk of loss of life or physics. The deal produces five priority actions to be done by the countries in reducing disaster risks. The five priority of disaster risk reduction efforts as the Hyogo recommendation are: (1) ensure that disaster risk reduction (DRR) is placed as the national and local priority with a strong institutional basis for its implementation, (2) identify, evaluate, and monitor disaster risks and enhance early warning utilization, (3) use the knowledge, innovation and education to build the culture of safety and resilience at all levels, (4) Reduce the basic risk factors, and (5) strengthen the disaster readiness with effective response at all levels. Strengthening capacities at the community level to reduce disaster risk at the local level, where individuals and communities mobilize the local resources as the efforts to reduce vulnerability to disaster risks. In Indonesia, one form of realization of the Hyogo agreement is SSB (the Disaster Ready Schools) program which is also known as SSB. SSB (the Disaster Ready Schools) program is an effort to build the schools readiness against disasters in order to arouse the awareness of all the elements in the field of education both individual and collective at the school and the school environment be it before, during and after a disaster occurs (P2MB UPI, 2010).

SSB (the Disaster Ready Schools) program is according to item 1, 3, and 5 of the Hyogo agreement which aims at providing protection to the school community when facing disasters such as earthquakes and tsunamis. The program has its strong reasons. One of them is that the school is the public space where the next generation gathers in order to gain knowledge and experiences. The next generation of this nation needs protection, so that the learning process can still run well despite the fact that disaster may occur at anytime. In line with the Hyogo agreement, Indonesia establishes indicators and parameters of school readiness in disaster risks reduction such as the earthquake and tsunami. The indicators and parameters of disaster preparedness are organized by the team of P2MB UPI 2010. The details can be seen in the explanation below. First, the indicators of Knowledge and Skills. The parameters are: a) the knowledge of the types of dangers, b) the knowledge of the sources of dangers, c) the knowledge of the amount of dangers, and d) the impacts of dangers and e) tsigns, e) the dangers that exist in the school environment, f) the access to all parts of the school to increase the capacity of knowledge, understanding and skills, g) the readiness (reference materials, participate in training, teacher meetings, village meetings, students jamboree, etc.), h) the knowledge about the history of disasters that ever occurred in the school or neighborhoods, i) the knowledge about the vulnerabilities and the capacity of schools and neighborhoods, j) the knowledge about the effort that can be done to minimize the disaster risks in schools, k) the skills of all school components in running an emergency response plan, l) the existence of regular simulation activities, m) the socialization and readiness training for the school community and school stakeholders. Second, the indicators of Policies, Agreements, and Regulations that support the school readiness efforts. The parameters are: a) the assessment document for disaster risk made together by the school community and school stakeholders, the protocols of communication and coordination, b) the existence of Schools Readiness SOP which agreed and implemented by all the school components, c) the agreement and the availability of evacuation site or the nearest shelters



from schools which socialized to all school components, the parents, the local community, and the local government. Third, the indicators of Documentation. The parameters are: a) the school documentation which is duplicated and stored well, in order to stay there, even if the schools affected by the disasters, b) the note of important information that is easy to use by the school component, such as a nearby emergency helps, the health centers/hospitals, and the relevant authorities, c) the school evacuation maps with signs and markers attached which can be easily understood by all school components. Fourth, the indicators of the access to information about the dangers on the natural signs, information and environment, and authorities (local government and BMG). The parameters are: a) the preparation of tools and alarms that are agreed and clear all components of the school, b) the mechanism of socialization of the information about the warning of danger in school environment, c) the good understanding of all school components about how to react to the warning of danger, d) the existence of the officers who are responsible and authorized to operate early warning tool, the maintenance of early warning tools, e) the existence of groups of SSB (the Disaster Ready Schools) program including the students representatives, f) the availability of basic equipments and the supply of basic needs after a disaster that can be fulfilled, and accessed by the school community, such as first aid and evacuation, medicine, tarpaulins, tents and clean water sources, g) the routine monitor and participatory evaluation on SSB (the Disaster Ready Schools) program (regular test or training), h) the cooperation with relevant disaster management agencies such as with the local government or with BPBDs / government agency responsible for the coordination and implementation of disaster management in the city/regency.

## Method

Based on the usage level, this research belongs to the evaluative research because it aims to determine the extent to which a program or policy has been progressing well. Meanwhile, based on the way of the data analysis, this research is a descriptive research. To get the research respondents, sampling technique was used because it was almost impossible to reach all research subjects of the large amount (Sugiarto et al 2003). The technique of data collection techniques are described as follows. The research population was all primary school which is in the red zone area of Padang City. The sampling was done two stages. The first one was the sampling of school, set or show the schools in the red zone area. Eight schools were chosen. They were the schools that represent the North, Central, and South region of the red zone area. The first one was the sampling of the research respondents (Research in Primary Schools). Two classes were chosen at the two schools randomly. The schools were SDN 18 Air Tawar Barat and SDN 52 Padang Sarai. The number of students at both schools was 83 students.

## Results and Discussion

### General findings

The evacuation points around the SSB (the Disaster Ready Schools) are the non-natural evacuation point like the high buildings and shelters. The distances from the SSB (the Disaster Ready Schools) to the evacuation point are very varied, some are close and the rest are far. Among the eight the SSB (the Disaster Ready Schools), only four schools have the short distance to high buildings including SD 18 (to UNP), SD Percobaan (the shelter owns by the school), SMA Pertiwi (to UNP), and SMK N 5 (owns the 3 floor building). The average distance from the SSB (the Disaster Ready Schools) to the high buildings is 0 - 1.5 km. Three SSB (the Disaster Ready Schools): SD N 28 Padang Sarai, SD N 52 Parupuk Tabing, and SMP Angkasa have the considerably far distance to the evacuation point of high buildings. Only one school that is close enough to the natural evacuation point which is SMP Negeri 19 Bungus Teluk Kabung because it is located in a hilly area approximately 2-3 km from the school. It can be said that almost 95% of schools SSB



has a considerably far distance to the natural evacuation point or hills. However, the distance to the artificial evacuation point or high buildings is not too far away.

The distance to the natural evacuation point from SSB (the Disaster Ready Schools) program is far enough or approximately 3-5 km. This area is around the by-pass road towards the East Padang. The natural evacuation points in the by-pass can be reached by quick walk/jog on average time 10-15 minutes. On the other hand, the shelters along the red zone are far enough and generally located in the residential areas. The students of SSB (the Disaster Ready Schools) program generally tend to not know exactly the location of the nearest shelters from their schools, except the students of SMK N 5 Padang since their school is the shelter. The shelters of SMA N 1 Padang and SMP N 7 Padang are close enough (about 500 meters). Among the eight SSB (the Disaster Ready Schools), only three schools have the disaster mitigation signs. They are SMA Pertiwi Padang, SMK N 5 Padang, and SD Percobaan. There are signs of the gathering place if the earthquake and tsunami occur. In addition, SMA Pertiwi also has fire evacuation signs. There are also the information boards on how to save themselves and the direction of evacuation. Based on the observations and interviews, the data about the rules or schools SOP that must be obeyed by every school components when a disaster actually occurs were also obtained. The other SSB schools do not have disaster mitigation signs. The students admitted they never saw the signs provided by the school about how to save themselves when a disaster occurs. There are no information boards about the escape from the disaster. The schools also do not have rules or disaster SOP if a disaster actually occurs. Some schools have the magazine wall but no writings related to disaster found.

Among the eight schools, only two schools have the disaster warning system. They are SMA Pertiwi I Kota Padang and SD Percobaan. The disaster warning is also often referred to as an early warning system which should be provided by the school. This provision was started since 2010. Until now, the siren is still in good condition and can be used whenever needed. Other SSB schools are not equipped by early warning systems such as sirens and other marks. From the answers of the respondents, it is suggested that an early warning system of the school is only the responsibility of the up above authority, in this case the government, such as the Department of Education, BNPB or other related institutions. The early warning system provided by the government such as the siren is also not known to the school community. In other words, it still lacks of socialization, except SD 28 Padang Sarai that routinely do it two times a year and the last one was held in 2014.

## **Special Finding**

### ***The Knowledge of Schools Community***

Students' knowledge of the source of danger in general is quite good. The average value is 3.1. The top three highest scores are SD Percobaan Purus, SMK N 5, and SMA Pertiwi with result average of 3.4. Students are generally able to provide answers about the natural disasters that can happen at any time which are earthquakes, tsunamis, landslides, floods, and fires. Students are also able to provide answers that for the area of Padang City, the greatest danger of negative effects on people's lives is the earthquake and tsunami. Students' knowledge of the size or great danger, especially earthquakes, generally they do not know for sure. The answers given tend to be hesitant. Many students do not know the scale of how strong an earthquake can destroy a building. Information about the height of the tsunami, as often reported in the media is also unknown student. It can be said that the students' knowledge of the magnitude of the danger is low.

Students' knowledge of disaster signs depend on the availability of signs. Students whose schools have disasters signs such as SMA Pertiwi I can provide answers about the meaning of the disasters signs at schools. On the other hand, the students whose schools do not have the disasters signs at schools tend to have low knowledge about disaster mitigation signs. Knowledge of students to the point of disaster mitigation already exists. Students know that the place to avoid the risk of disaster is to a higher place. The high places in this research are the natural and artificial high places. The high places that take advantage of the earth are



called the natural evacuation points, such as the hills. In Padang City, the east is known as the green zone which is located in the area by pass. On the other hand, the knowledge of the artificial high places or tall buildings around the school is still low, especially for elementary school students. Based on the interviews with key informants from the students, they gave the same answer: they did not know any buildings around the school which can be used as the evacuation points. Students' knowledge about the history of the earthquake and tsunami is also low. Students do not master the history of disasters that ever occurred, at least the disaster in school where they are studying. They only know the earthquake and tsunami in Aceh in 2004, Padang earthquake in 2007, and the earthquake in 2009 with major impact where nearly 1.000 people died. Generally, students and teachers also do not know that the West Sumatra in general and Padang City in particular has been frequently hit by huge earthquakes such as the earthquakes in 1822, 1835, 1904, 1926, 1943, 1977, 1981, 1995, and 2003.

### ***The Skills of Schools Community***

Disaster response skills tend to be good (3.2). The highest score was by SMK N 5 Padang. Students and teachers are generally able to provide answers to any actions that should be performed on the moment of danger. Students and teachers are able to explain how to escape from inside a building or a room; for example, stay under the table when in the building, run to safer places, and avoid other objects that may be dangerous. Students and teachers are also able to explain how to move towards the evacuation point like fast walking and running while paying attention to other dangers (motorcycles, cars, and trains).

### ***The Policies and School SOP***

Not all schools have the good school policies/SOP. This is an evident from the lack of completeness and even the absence of disaster documentation. The disaster mitigation documentation such as the disaster regulations, photographs, and letters are aimed to provide knowledge to the public (especially schools community) about the history of disaster. Of the eight schools, only three schools have the documents and not completed properly. The three schools are SMA Pertiwi, SMK N 5, and SD 28 Padang Sarai.

### ***The Emergency Response Plans/ The Resource Mobilization***

No schools have the emergency response plans/the resource mobilization. Generally, the school community does not know what to do as the emergency response plans/the resource mobilization when a disaster occurs. The emergency response plans/the resource mobilization are: work together or individually to establish a command post, conduct rapid assessments to determine the needs of the victims, coordinate with the relevant parties, socialize the information and provide assistance. Basically, SSB (the Disaster Ready Schools) program is a program that is more oriented on the aspect of the process tends to prioritize the services to the school community to avoid the disaster risks, especially earthquake and tsunami. The expected outcome of the program is the readiness of SSB school community in facing of danger in which every individual should have the knowledge, attitudes, and skills to save him from the danger of disaster that may come at any time.

The good knowledge and skills are not enough if not supported by other variables such as the policies outlined in disaster SOP compiled by the school and other relevant parties. The schools that have policies and standard operating procedures are regarded as the schools that have the good planning. Schools that have good planning, of course, provide a variety of good facilities and supporting infrastructure; for example, good documentation, means of communication, data storage area, and even its own shelter as the evacuation of the school. It is also important to have resource mobilization. It deals with the provision of specialized personnel, establishment of the standby force, and promotion unity in the form of cooperation.

The research data suggest that the level of readiness SSB (the Disaster Ready Schools) tends to be low. This is proved by the low score of performance indicators. The scores are only good in the aspects of



knowledge and skills while on the other aspects tend to be low. Therefore, it can be said that in average, SSB (the Disaster Ready Schools) readiness level remains low. It is because only a limited number of existing SSB have good readiness. These conditions certainly need serious attention from all parties, especially the relevant parties. It means that disaster mitigation activities are not only oriented on knowledge and skills, but also need the cooperation, the availability of facilities and infrastructure, availability of disaster regulations, completeness of documentation and documentation tools. Thus, the disaster issue is cross-cutting issues. The responsibility of the sustainability of SSB (the Disaster Ready Schools) is not only the responsibility of the school, but it also requires the role of all stakeholders from the top (the government) to the school community (students, teachers, staffs), parents, and society in general.

The results of the research are also interesting when associated with the program evaluation model. Referring to the Open Systems Model (OSM) of Nagarajan N. and Vanheukelen in McDavid and Howthorn 2006, the discussion of this research basically describes the input, process and output aspects. The input aspects are the knowledge and skills of the human resources, the facilities and infrastructure (equipments, medicines, tents, etc.), the disaster SOP, and the organization. The process aspects are the activities carried out such as disaster simulation activities and resources mobilization. The output aspects are the disaster documentation, and the plans that are issued in decrees, the SOP, and other regulations. By considering this, it is clear that the management of disaster is a holistic management. SSB (the Disaster Ready Schools) program should be viewed as a system in which each sub-system has their own respective roles, and every role is important. No matter how good the teachers are in teaching the issue of disaster and providing the training, if not supported by variables such as the support of the education, the provision of infrastructure by the government such as shelters and siren (early warning system), the awareness of the schools and teachers, society and NGO participation, the program SSB will be gone.

The existence of SSB is still needed in Padang City, but it needs improvement in certain parts. Things that need to be considered in order to maintain the sustainability of SSB are: 1) SSB program cannot be charged to the schools alone, but it requires the synergy of various parties, both public and private. SSB schools need the availability of infrastructure and infrastructure that require special budget and plans, 2) the schools that have low level of readiness needs more consideration to serve as the pilot re-project, 3) the disaster simulation should be used as a regular agenda of SSB; for example, having the simulation once every six months, 4) the celebration of the historic days, especially the history of the disaster with the activities of extras as a form of early warning to disasters that can happen any time, 5) the integration of the disaster problem into learning, so that the knowledge and skills of disaster are not only mastered by a few or a group of people. Some of the limitations in this study, among others; 1) the interviews were only conducted to some key informants, especially at the elementary school students because they are still very young due to the possibility of the answers given do not represent the opinions population, 2) the teachers as the informants might not too open because not willing to reveal that their schools which are already established as the SSB but categorized on the low level of readiness, 3) this research is in contact with the research policy the result of which require a view of many parties. However, due to various limitations, the conclusions made did not involve related parties such as Basarnas, BNPB, Kogami Padang, Padang City Administration, and community leaders.

## **Conclusion**

The results of the research are: 1). the school community knowledge about the disaster tends to be good (3.1) and the top three highest scores are by SD Percobaan Purus, SMK N 5 Padang, and SMA Pertiwi, 2). the disaster response skills tend to be good (3.2) and the highest score is by SMK N 5 Padang, 3). not all schools have the good school policies/SOP, 4). In general, no schools have the emergency response plans/the resource mobilization. Based on the conclusion, it is suggested: 1) the need of serious disaster mitigation efforts on the part of policy makers. The efforts must be done according to program and continuously, 2) in



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the attempts given, a variety of innovative activities should be done, such as doing the socialization and disaster response simulation periodically, the celebration of the disaster day, the celebration of the earth day, the celebration of the environmental day, and the empowerment of community (especially schools community), as well as the provision of facilities and infrastructure, 3) increase the school cooperation with related parties such as BNPB and Kogami, as well as the Department of Education.

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