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Analysis of the structural framework for schools affected by the Sunda Strait Tsunami in Pandeglang Regency

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Abstract. The Sunda Strait tsunami disaster in 2018 claimed the lives of more than 430 people and caused various damage to infrastructure in coastal areas. This disaster also had an impact on the education sector. Schools located in disaster-prone areas are vulnerable to building damage that causes casualties and psychological problems for students. The west coast of Pandeglang Regency is a tsunami-prone area and is home to hundreds of elementary and high school schools in the area. The aim of this study is to analyze of the structural framework for schools affected by the sunda strait tsunami. The research locus was determined by purposive sampling in three locations: MTs Masyariqul Anwar in Labuan, SDN Mekarjaya 3 in Panimbang, and SDN Tamanjaya 2 in Sumur. This research data analysis uses qualitative data analysis techniques by Miles, Huberman and Saldana (2014). This research used disaster school survey form issued by National Disaster Management Agency (BNPB) which regulated in Head of BNPB Regulation No. 4 of 2012 on Implementation Guidelines of Disaster Safe Schools. The research finding that MTs Masyariqul Anwar, SDN Mekarjaya 3, and SDN Tamanjaya 2 can be concluded that MTs Masyariqul Anwar and SDN Tamanjaya 2 have a good level of school security with some notes that need to be improved. Meanwhile, SDN Mekarjaya 3 has a sufficient level of school security with several factors that are so inadequate that they must be repaired and improved immediately.

Keywords. Disaster Management, Disaster Safe Schools, Structural Framework, Sunda Strait Tsunami.

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1. Introduction

Recorded in history, in 1883 a major tsunami occurred in the Sunda Strait triggered by the eruption of Krakatoa volcano which resulted in damage to infrastructure and more than 35,000 fatalities [1][2][3]. The same event repeated in 1928 that triggered a small tsunami around Mount Anak Krakatau [4]. In addition to volcanic eruptions, the Sunda Strait also has the potential for tsunamis triggered by tectonic processes or earthquakes due to plate movements in the subduction zone or known as megathrust such as the tsunami that occurred in Aceh 2004, Mentawai 2005, and Pangandaran 2006 [5][6].

Tsunamis in Indonesia have occurred many times. One of them is the Sunda Strait Tsunami natural disaster that occurred on December 22, 2018. Tsunamis that cause high waves to hit the beaches around Pandeglang, Serang, and South Lampung. The wave was initially only declared as a tidal wave, but was later modified and called a tsunami disaster event. According to the Meteorology, Climatology, and Geophysics Agency (BMKG) and the Geological Agency, the tsunami was caused by an underwater landslide due to the eruption of Mount Anak Krakatau. This tsunami disaster claimed the lives of more than 430 people and caused various infrastructure damage in coastal areas [7].

According to the latest National Disaster Management Agency (BNPB) data, the death toll was 437 people, 14,059 people were injured, 16 people were missing, and 33,179 people were displaced. The number of affected people came from five regencies, one of which was Pandeglang Regency in Banten Province [8].

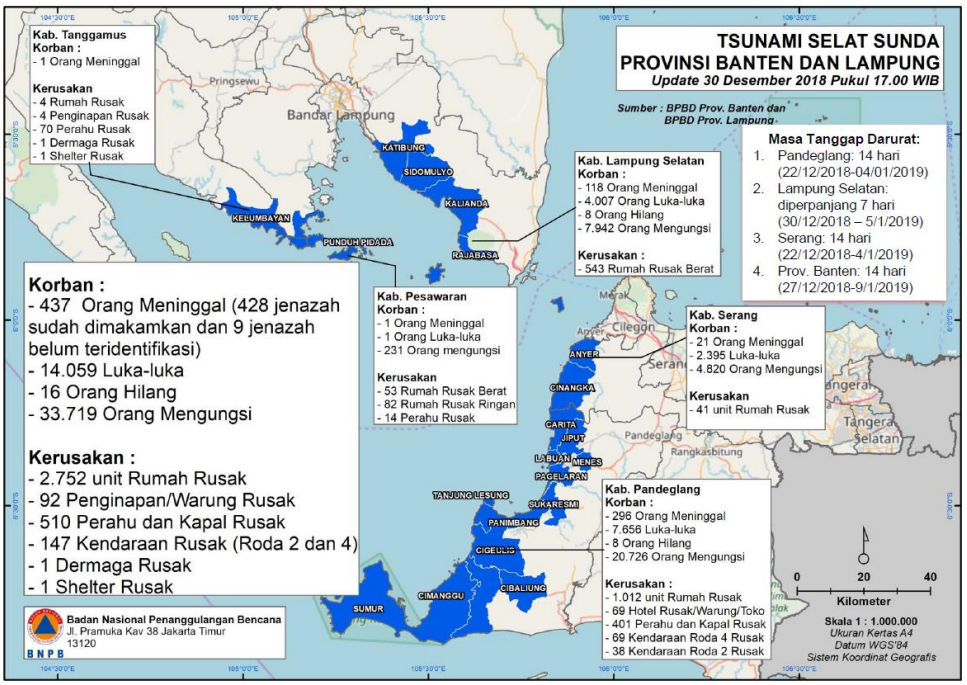

Figure 1. Number of Victims and Damage Due to the Sunda Strait Tsunami [8]

Based on information from Figure 1, it is known that Pandeglang Regency was the worst affected area by the disaster with the highest number of victims with 298 people died, 7,656 people were injured, 8 people were missing, and 20,726 people were displaced. In addition, physical damage in Pandeglang Regency is also the highest among other affected districts, with 1,012 damaged houses, 69 damaged hotels/stores/shops, 401 damaged boats, and 107 damaged vehicles.

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In addition to having an impact on the weakening of the economy and the resilience of government, disasters can also have an impact on the world of education. Losses to school elements such as teachers and pupils, teaching and learning processes, property, and provision due to disasters, resulting in millions of young people's futures being threatened. The cessation of education due to conflict and natural disasters is the main cause of the exit of children and young people from the path of education. The elimination of their right to education deprives them of the opportunity to develop themselves out of poverty and marginalization [9] (Pereznieto and Harding, 2013). The disaster caused many schools to be damaged or destroyed. For example, many schools were destroyed or damaged during the Aceh earthquake and tsunami (2004), Yogyakarta earthquake (2006), eruption of Mount Merapi (2010), and other natural disasters resulting in the cessation of teaching and learning activities.

The sunda strait tsunami disaster also had an impact on the education sector. According to data from the Education Quality Assurance Agency (LPMP) of Banten Province, there were 98 students and 106 teachers affected by the tsunami, both dead, injured, and lost their homes / families. While in Banten Province itself there are 3 schools affected with the amount of damage from heavy to light [10]. Especially for Pandeglang Regency, the number of affected students and teachers reached 182 people spread across six sub-districts, namely Sumur District, Cigeulis Subdistrict, Cimanggu Subdistrict, Labuan Subdistrict, Panimbang Subdistrict, and Carita Subdistrict. Three schools damaged by the tsunami were all located in Pandeglang Regency.

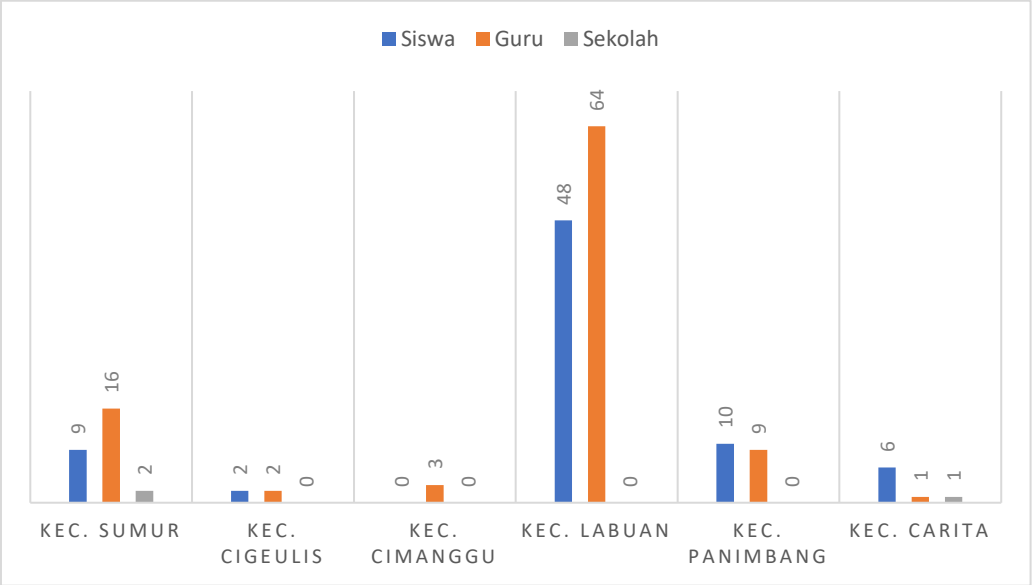

Figure 2. Education Sector Affected in Pandeglang Kabupaten

The data shown in Figure 2 shows that the education sector, including students who are still classified as children, is also a vulnerable sector that must be protected with systematic, targeted, and comprehensive disaster management efforts. If not taken seriously, disasters can also have tremendous physical and mental effects on children. Physically, children can be exposed to health problems such as malnutrition due to difficult access to healthy food and being vulnerable to disease due to unhygienic environmental conditions and lack of clean drinking water. This is certainly very dangerous considering that children are more vulnerable to disease than adults [11]. Therefore, school as a form of formal education unit should be a safe place for children. However, data from the last 15 years from BNPB in 2017 said that there were 46,648 schools affected by the disaster. This shows that the school has not fully become a safe, clean, healthy, child-friendly, and fun place for children and other school residents, so

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the school must create a conducive, comfortable and safe environment from various threats of disaster hazards to support the learning process [13].

When the learning process is disrupted, a child's education can be cut off, sometimes cut off forever, resulting in a permanent negative impact, both economically and socially. For the education sector, the worst impact of a disaster is the loss of life or severe injuries in schools. In addition, there are also many other consequences that can permanently affect the future of children, including: schools that cannot be used because they are damaged; schools that cannot be used because they are converted as temporary housing or shelters; schools that are no longer accessible; loss of physical access to a friendly children's playroom; Loss of school equipment and educational materials; Teachers cannot teach; Learners are expected to make a living, assist in recovery and in caring for their siblings on a full-time basis; and psychosocial disorders in teachers, learners and other education personnel [12].

One of the preventive measures taken by the Government to reduce disaster risk and protect children when teaching and learning activities take place in the education unit is with the existence of disaster safe school programs. Disaster safe school is a safe place, comfortable, clean, healthy, green, inclusive, and fun as a form of embodiment of child-friendly schools has been done by various other parties (ministries / institutions / private / international development partners) in collaboration with the Ministry of Education and Culture. Disaster safe schools include three main pillars that include safe school facilities, disaster management in schools, and preventive education. Judging from the three pillars, the implementation of disaster safe schools is certainly inseparable from the process of internalizing character values to form the character of preparedness in madrasah / school residents [17].

The adverse effects of a disaster can be minimized by conducting assessments of hazards and risks, planning based on the results of studies, conducting physical and environmental protection, and making preparedness plans [12]. One of them is that school buildings that cannot withstand disasters need to be minimized because they are very vulnerable in terms of security, not only threatening the lives of children, but the damage or destruction of physical infrastructure is a loss of economic assets for the State. For this reason, this study aims to analyze the Structural Recovery of Safe Schools affected by the Sunda Strait Tsunami Disaster.

2. Methods

This research uses descriptive qualitative research. This qualitative research looks at the condition of objects that are natural or not experimental, such as quantitative research. The purpose of a natural object is that the object under study does not go through a process of manipulation by the researcher so that the condition of the object from the beginning to the end of the study does not change significantly. The object of qualitative research is seen as dynamic and holistic, meaning that the object is an inseparable unit [14]. The research location is in Pandeglang Regency, Banten Province, Indonesia by taking school locations by purposive sampling. The consideration in determining the research locus is that these schools are one of the areas affected by the Sunda Strait Tsunami and are located in the coastal areas of Pandeglang Regency, Banten, so the research loci selected in this study include MTs Masyariqul Anwar in Labuan, SDN Mekarjaya 3 in Panimbang, and SDN Tamanjaya 2 in Sumur. These three locations have interests to be studied, namely the location within 300 meters of the beach and entered into the red zone of the Tsunami. Data collection techniques are carried out through observation, documentation, and interviews (in-depth interviews). This research data analysis uses qualitative data analysis techniques Miles, Huberman and Saldana [15]. This data analysis technique consists of three components, namely data condensation, data presentation, and conclusion/verification withdrawal. Then the presentation of the results of this study uses the

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indicators in the BNPB Regulation No. 4 of 2012 and weighting is carried out in each indicator assessment result. Then, the results of the assessment will be presented in the form of percentages classified in the criteria Very Good (81 - 100%), good (61 - 80%), Enough (41 - 60%), Less (21 - 40%) and very less (0-20%).

3. Results and Discussion

3.1 Results

School buildings and school facilities that are not safe from disasters will be very vulnerable in terms of security which can threaten the lives of children and damage facilities and infrastructure. Safe School Facilities involve education sector authorities, students (children), architects, engineers, builders and school committee members in determining the safe location, design, construction and maintenance of schools. The scope of this research is only limited to the structural framework. The structural framework has 4 criteria and consists of 45 indicators. Each indicator has a different weight value. The assessment guidelines used in this study are based on the Head of BNPB Regulation No. 4 of 2012 concerning Guidelines for Disaster Safe Schools [16].

3.1.1 Safe Location

The choice of school location is important for the continuity of the school's existence and the best school maintenance mechanism. Locations with a high potential for disaster should be avoided because it will disrupt sustainability and will cause problems in the future. However, in several cases due to the absence of land and without careful calculations, schools were finally built in tsunami-prone areas because they did not prioritize disaster risk reduction efforts. The selection of this location is related to school development planning, including location conditions, school layout planning and the shape of the school building.

Based on the Guidelines for Safe Schools (Head of BNPB Regulation No. 4 of 2012), aspects of disaster safe school locations are described in several criteria. The following are the results of research regarding the location of the school:

Table 1. Disaster Safe Location Indicator

No	Criteria	MTs Masyariqul Anwar	SDN Mekarjaya 3	SDN Tamanjaya 2
1	Land Location according to RTRW	V	V	V
2	The land has the status of land rights from the holders of land rights	V	V	V
3	Sufficient land area to build school infrastructure	V	-	V
4	The land is protected from potential that threatens life safety, protected from disturbances from water pollution, noise, and pollution udara	-	-	-
5	The location of the school is a bit far from the existing road border	-	-	-

Source: Researchers results, 2019

From table 1 it is known that the three locations are in accordance with the provisions of the RTRW of Pandeglang Regency. Each school is located in a residential area in accordance

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with the provisions in the Pandeglang Regency RTRW, so that the location of the school is appropriate. This supports the implementation of learning activities and educational facilities that are easily accessible to the population.

In the second criterion, the land of each school already has a valid Certificate of Property Rights (SHM). The location land of SDN Mekarjaya 3 and SDN Tamanjaya 2 is owned by the Pandeglang Regency Regional Government. While the land location of MTs Masyariqul Anwar is owned by individuals, in this case the Masyariqul Anwar Foundation.

In the third criterion, the land area for MTs Masyariqul Anwar and SDN Tamanjaya 2 is sufficient to build school infrastructure. However, for SDN Mekarjaya 3, the land area owned is not enough, an area of 510 m2 is only enough for 6 classrooms, 1 teacher's room and 1 medium-sized ceremonial field. This lack of land is reflected in the lack of school infrastructure that can support learning efforts, such as the absence of libraries and laboratories. Even the sanitation facilities for students and teachers are still inadequate. This school also cannot build additional infrastructure because it is located very close to the houses of local residents.

These three schools were not able to meet the fourth criterion, which was related to land that was spared the potential that threatened life safety. For more details, please see the following figure:

Figure 3. Location Distance of MTs Masyariqul Anwar from the Coastline
Source: Google Maps, 2019

The location of the MTs Masyariqul Anwar land is back to the beach with a distance of about 260 meters from the coastline. Based on the Pandeglang Regency Tsunami Risk Map (2014), the location where MTs Masyariqul Anwar is located is in the red zone with a high level of tsunami risk.

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Figure 4. Location Distance of SDN Mekarjaya 3 from the Coastline
Source: Google Maps, 2019

The location of SDN Mekarjaya faces the beach and is separated by Jalan Panimbang. The distance of the school from the shoreline is 229 meters. According to the Pandeglang Regency Disaster Risk Map, SDN Mekarjaya 3 is in the red zone with a high level of tsunami disaster risk.

Figure 5. Location Distance of SDN Tamanjaya 2 from Garis the Coastline
Source: Google Maps, 2019

Of all the schools in Pandeglang, SDN Tamanjaya 2 is the school with the closest distance from the coastline, which is only 50 meters away. The location of SDN Tamanjaya 2 is indeed in the red zone with a high level of tsunami disaster risk. This resulted in SDN Tamanjaya 2 being affected by the Sunda Strait tsunami which was severe enough to destroy one library building and damage other classrooms.

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As for the last criteria, the three schools are very close to the road border. The three schools are directly adjacent to the border of the road used for community mobilization. The road in front of MTs Masyariqul Anwar becomes the main road for visitors who want to visit Carita Beach. While the road in front of SDN Mekarjaya 3 and SDN Tamanjaya 2 becomes the only road that is enough for four-wheeled vehicles to visit Ujung Kulon National Park. Although the road border is not as beautiful as the road in front of MTs Masyariqul Anwar, it should be a concern to ensure the safety and security of students.

Based on the indicators described in table 1, each indicator after getting one point is accumulated as the value of each structural indicator. The results of the overall assessment of the structural components can be seen in table 2 below:

Table 2. Accumulated Assessment of Disaster Safe Location Indicators

No	Criteria	MTs Masyariqul Anwar	SDN Mekarjaya 3	SDN Tamanjaya 2
1	Safe Location(5)	3	2	3

Source: Research results, 2019

3.1.2 Building Structure

The building structure must meet the requirements for safety, health, convenience including eligibility for children with special needs, comfort and security in accordance with the Minister of Public Works Regulation 29 of 2006 and the Technical Guidelines for Earthquake Resistant Houses and Buildings issued by the Ministry of Public Works in 2006.

Schools as learning and teaching facilities must be built with high safety standards to ensure effective conditions for learning. The school building structure must meet the safety and service requirements as well as the SNI for building construction. In the case of this research, the basis for assessing the structure of the building is based on Head of BNPB Regulation No. 4 of 2012. In these guidelines, there are indicators that will get points according to the results of observations. The indicators assessed are related to structural components, namely foundations, beams, walls, columns and roofs. From the results of observations on the indicators, each appropriate indicator gets one point and is accumulated as the value of each building structure indicator. The results of all structural components can be seen in table 3 below:

Table 3. Accumulated Assessment of Safe Building Structure Indicators

No	Kriteria	MTs Masyariqul Anwar	SDN Mekarjaya 3	SDN Tamanjaya 2
1	Foundatin (1)	1	1	1
2	Beam (3)	2	3	3
3	Column (2)	2	1	2
4	Wall (2)	0	0	2
5	Roof (2)	0	0	1
Jumlah		**5**	**4**	**9**

Source: Researchers results, 2019.

From the results of the research review at the research site, it was seen that the buildings have not undergone restoration for at least 10 years, except SDN Tamanjaya 2 which received renovation assistance from private and humanitarian organizations due to its school building being heavily damaged by tsunami waves in early 2019. What is striking in the three schools is the damage to the ceiling and roof and small cracks in the walls and columns whose material still uses heavy bricks. It can generally be seen in the following figure:

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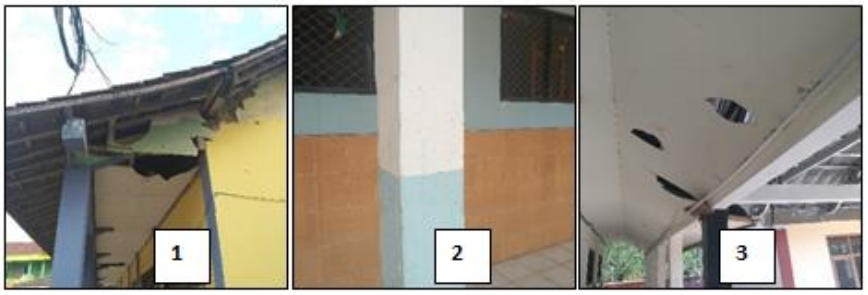

Figure 6. Condition of School Structure (1) Damaged Roof and Ceiling at MTs Masyariqul Anwar; (2) Cracked Column at SDN Mekarjaya 3; (3) Perforated ceiling at SDN Tamanjaya 2
Source: Research results, 2019

Damaged and fractured conditions were found at several points in each school. So this will certainly be very dangerous for students and teachers who move in it. The basic materials of the walls and roof still use heavy materials (concrete and clay). But on the beams in each school building is still fairly safe and strong standing on the foundation.

3.1.3 Safe Class Design and Layout

Safe classroom design is class design and class arrangement, the ideal arrangement of space so that it has as little risk as possible if a disaster occurs at any time. Based on the indicators in Head of BNPB Regulation No. 4 of 2012 there is an assessment of architectural components, ceilings, doors and windows, fixed ornaments, stairs, floors, and ceramics. In addition, this assessment also includes class contents such as benches, chairs, and other furniture. The results of the accumulated values of each indicator from all components can be seen in table 4 below:

Table 4. Accumulated Assessment of Safe Class Arrangement Design Indicators

No	Criteria	MTs Masyariqul Anwar	SDN Mekarjaya 3	SDN Tamanjaya 2
1	Architectural Components (11)	8	10	10
2	Furniture Components (11)	5	5	4
Total		**13**	**15**	**14**

Source: Researchers results, 2019

From the observations at the research site, the three schools do not yet have first aid kits in each classroom. First aid kits are only placed in the teacher's room. While the three schools also have not tied / nailed furniture that easily falls and breaks and bookshelves to the wall to strengthen the position of shelves when there is an earthquake. The three schools have also not implemented a door design that opens out. This needs to be done to facilitate the evacuation process in the event of a disaster. Figure 7 shows documentation of the results of the research site review:

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Figure 7. Condition of School Architecture and Furniture (1) Classroom windows of MTs Masyariqul Anwar which have not used trellises; (2) The design of the door of SDN Mekarjaya 3 which still opens inward; (3) Wall decorations that are pasted using masking tape instead of frames at SDN Tamanjaya 2.
Source: Research results, 2019

3.1.4 Safe Facilities and Infrastructure Support

Based on the indicators in Head of BNPB Regulation No. 4 of 2012, indicators included in the Support of Safe Facilities and Infrastructure are utilities, fire extinguishers, electrical equipment and the availability of evacuation routes. Based on the results of the assessment of these indicators, the accumulated value of each indicator is as follows:

Table 5. Accumulated Assessment of Safe Facilities and Infrastructure Support Indicators

No	Criteria	MTs Masyariqul Anwar	SDN Mekarjaya 3	SDN Tamanjaya 2
1	Utilities (2)	2	2	2
2	Other Utilities (APAR) (3)	3	0	0
3	Neighborhood (3)	3	3	3
Total		**8**	**5**	**5**

Source: Researchers results, 2019

Of the four sub-pillars of indicators of the structural framework for implementing disaster safe schools, the ac Accumulated Assessment of Structural Framework Criteria for MTs Masyariqul Anwarcumulated calculations are as follows:

Table 6. Accumulated Assessment of Structural Framework Criteria for MTs Masyariqul Anwar

No	Criteria	Number of Indicators	MTs Masyariqul Anwar	Bobot	Total Final Percentage
1	Safe Location	5	3	30%	18%
2	Safe Building Structure	10	5	40%	20%
3	Safe Class Arrangement Design	22	13	15%	8%
4	Safe Facilities and Infrastructure Support	8	8	15%	15%

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	Total	45	29	100%	61%

Source: Researchers results, 2019

Based on the results of the table above, the assessment of the structural framework at MTs Masyariqul Anwar is 61% or in good classification.

Table 7. Accumulated Assessment of Structural Framework Criteria for SDN Mekarjaya 3

No	Criteria	Number of Indicators	SDN Mekarjaya 3	Bobot	Total Final Percentage
1	Safe Location	5	2	30%	12%
2	Safe Building Structure	10	4	40%	16%
3	Safe Class Arrangement Design	22	15	15%	10%
4	Safe Facilities and Infrastructure Support	8	5	15%	9%
	Amount/Percentage	45	26	100%	47%

Source: Researchers results, 2019

Based on the results of the table above, the assessment of the structural framework at SDN Mekarjaya 3 is 47% or in sufficient classification.

Table 8. Accumulated Assessment of Structural Framework Criteria for SDN Tamanjaya 2

No	Criteria	Number of Indicators	SDN Tamanjaya 2	Bobot	Total Final Percentage
1	Safe Location	5	3	30%	18%
2	Safe Building Structure	10	9	40%	36%
3	Safe Class Arrangement Design	22	14	15%	9%
4	Safe Facilities and Infrastructure Support	8	5	15%	9%
	Amount/Percentage	45	31	100%	72%

Source: Researchers results, 2019

Based on the results of Table 8, the assessment of the structural framework at SDN Tamanjaya 2 is 72% or in good classification. So that the final results of the assessment of structural frameworks and the classification of safe levels of each school that is the focus of the study can be seen in Table 9.

Table 9. Structural Framework Assessment

No	Criteria	MTs Masyariqul Anwar	SDN Mekarjaya 3	SDN Tamanjaya 2
1	Safe Location	18%	12%	18%
2	Safe Building Structure	20%	16%	36%
3	Safe Class Arrangement Design	8%	10%	9%

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4	Safe Facilities and Infrastructure Support	15%	9%	9%
Amount/Percentage		61%	47%	72%
Classification		Good	Adequate	Good

Source: Researchers results, 2019.

3.2 Discussion

3.2.1 MTs Masyariqul Anwar di Labuan

MTs Masyariqul Anwar is in an unsafe location, in the red zone with a high tsunami risk level with the school distance from the coastline only about 260 meters. In principle, there is no limit on which areas are safe for tsunamis and which are not, because the danger of a tsunami threat depends on several factors, namely land use, slope level, coastline length, which then gets the wave height (run-up) and the inundation zone achievement. BNPB, 2016). Inundation is the maximum distance that a tsunami wave can travel horizontally. In the 2004 Aceh Tsunami, the tsunami inundation distance could reach up to 6.5 kilometers. With the location of the school which is only 260 meters from the coastline, MTs Masyariqul Anwar is not safe. Besides being a very risky location, MTs Masyariqul Anwar also still needs to improve the resilience of school facilities. From the research results obtained. MTs Masyariqul Anwar has not done a complete renovation of the building even though it is more than 50 years old. It is evident from the damaged roof and ceiling as well as cracked walls that make the school building at MTs Masyariqul Anwar very risky when an earthquake or tsunami occurs. This is certainly very dangerous for all students, teachers, and also other officers.

In terms of class design and arrangement, MTs Masyariqul Anwar still has not implemented a door design that leads out. This will certainly complicate the evacuation process because disaster victims, including children, will tend to panic when a disaster occurs. This is also not in accordance with the BNPB Regulation No. 4 of 2012 which recommends that the door be opened to the outside. In addition, there are also many windows that do not use trellises, as well as bookcases and furniture that fall easily during an earthquake that has not been firmly attached to the walls of the building. All of these things make the risk of victims and losses due to disasters higher.

In terms of facilities and infrastructure, MTs Masyariqul Anwar already has a light fire extinguisher (APAR) even though it is not placed in each room. MTs Masyariqul Anwar also has tsunami evacuation signs established by the local government. These signs direct students and teachers at MTs Masyariqul Anwar to a gathering place about 2 kilometers from the school building. These results indicate that in terms of the safe location (18%), the safe building structure (20%), the safe class arrangement design (8%), and the safe facilities and infrastructure support (15%). Overall, the assessment of the structural framework at MTs Masyariqul Anwar has met the criteria as a disaster safe school with the category (level) Good.

3.2.2 SDN Mekarjaya 3

SDN Mekarjaya 3 is one of the schools affected by the Sunda Strait Tsunami where the tsunami inundation caused minor damage to buildings and school facilities. Although not severe, but enough to make the school stop carrying out teaching and learning activities for 1 week.

Of the three research locations, SDN Mekarjaya 3 became the school with the lowest security level with 12% or only two-thirds of the security level of MTs Masyariqul Anwar and SDN Tamanjaya 2. This can be seen from the results of the assessment on the Structural Framework which is 47%. Of course, much has to be done as an effort to improve school safety

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in order to implement Disaster Safe Schools, especially in the scope of the Structural Framework.

In terms of location, SDN Mekarjaya 3 is also located in the red zone with a high tsunami risk level with a distance of 229 meters from the coastline. The distance between SDN Mekarjaya 3 and the coastline is 20 meters shorter than the distance between MTs Masyariqul Anwar. However, with its position facing the sea, the school will be able to monitor the presence of receding sea water as a marker of the occurrence of a tsunami so that the independent evacuation and rescue process will be faster.

Regarding the structure of the building, SDN Mekarjaya 3 received renovation assistance from a post-Tsunami NGO in the form of repairing damaged buildings and facilities and constructing a new building consisting of three classes. Unfortunately, the assistance provided has not referred to the PUPR regulations or the Head of BNPB Regulation No. 4 of 2012. This is found in the design of the classroom door and the teacher's room which is still open inward. The building materials for the construction of a new building at SDN Mekarjaya 3 still use heavy bricks. So that the renovation and construction of new school buildings does not necessarily reduce the risk of disasters that have existed before.

In terms of facilities and infrastructure, SDN Mekarjaya 3 still needs a lot of improvement. One of them is the need to procure APAR. It is important to have this according to the standards contained in the PUPR rules and the Head of BNPB Regulation No. 4 of 2012. Apart from the APAR, SDN Mekarjaya 3 does not yet have an evacuation sign that can direct students and teachers to the gathering point. Local residents themselves have made a gathering point which is 1 kilometer from the school but the route still needs a lot of improvement so that it can be used effectively by residents and does not pose any other risks. Overall, the assessment of the structural framework at SDN Mekarjaya 3 is 47%. These results indicate that in terms of the safe location (12%), the safe building structure (16%), the safe class arrangement design (10%), and the safe facilities and infrastructure support (9%), thus overall SDN Mekarjaya 3 has met the criteria as a disaster safe school with the category (level) enough.

3.2.3 SDN Tamanjaya 2

SDN Tamanjaya 2 has the highest school safety score compared to the other two schools. SDN Tamanjaya 2 has a Structural Framework score of 72%. Even so, there are still some things that need to be improved in an effort to achieve disaster safe schools. The most striking thing about SDN Tamanjaya 2 is its location which is very close to the coastline. SDN Tamanjaya 2 was the only school in Pandeglang Regency that was heavily damaged by the Sunda Strait Tsunami. In addition, SDN Tamanjaya 2 also has a history of other disasters such as landslides in 2013 which caused panic, cloudy water, disrupted school activities and schools were closed for 2 days.

SDN Tamanjaya 2 received renovation assistance and the creation of new library buildings from various private companies and humanitarian organizations. But the results of the renovation of the school and the construction of a new library building have not referred to PUPR and parch BNPB rules no. 4 of 2012. This is seen from the leaves of classroom doors and library buildings that are still open into and there is no procurement of APAR in each room in SDN Tamanjaya 2. This should have been easy to do but a lack of knowledge and oversight led to this wrong design being re-applied. Overall, the assessment of the structural framework at SDN Tamanjaya 2 is 72%. These results indicate that in terms of the safe location (18%), the safe building structure (36%), the safe class arrangement design (9%), and the safe facilities and infrastructure support (9%), thus overall SDN Tamanjaya 2 has met the criteria as a disaster safe school with the category (level) Good.

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4. Conclusion

Based on research that has been conducted on the analysis of the implementation of structural framework of disaster safe schools in Pandeglang Regency in three schools, namely MTs Masyariqul Anwar, SDN Mekarjaya 3, and SDN Tamanjaya 2, it can be concluded SDN Mekarjaya 3 although it is in the category (level) Enough, but it is a school with a low level of fulfillment according to the Structural Framework for Disaster Safe Schools in dealing with the potential threat of a Tsunami so that it needs to get immediate improvement priorities, especially in aspects of location, spatial planning and availability of facilities and infrastructure, school safety infrastructure and other supporting efforts. While MTs Masyariqul Anwar and SDN Tamanjaya 2 are schools with a good level of school safety category (level), however, there are some notes that still do not met the criteria, so attention needs to be paid attention to improvement as disaster safe schools with improvements and compliance with aspects of spatial design classrooms and complete the need for safety facilities and infrastructure in schools according to the scale of need as an effort to reduce disaster risk towards disaster safe schools.

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