Enhancing role of elementary school in developing sustainable disaster preparedness: a review with some examples from disaster-prone areas of Merapi
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Abstract. Emergencies of natural disasters often occur suddenly. In an effort to reduce disaster risk, good preparedness is needed, especially in the locations that become the center of activities, one of which is elementary school. The school is responsible for ensuring the safety of its citizens in disaster emergencies, especially elementary schools whose students are included in the vulnerable age group. On the other hand, schools as educational institutions should also be able to play a role in increasing students' knowledge and skills concerning disasters. Students are the fastest agents of knowledge transfer from school to their families and communities. Therefore, early child empowerment to understand disaster risk reduction is very important and useful. In disaster-prone areas of Merapi eruption, there are many elementary schools. With the potential for eruption hazards in the future, it is necessary to increase the role of elementary schools in building preparedness in facing disasters. The purpose of this paper is to identify how to improve the role of elementary schools in building disaster preparedness. Through a systematic literature review of 25 journals and books in range year 2006 to 2018, both in English and Indonesian added by a variety of data. This paper tries to present the existing role of primary schools and what efforts are made in enhancing the role. The review highlights some points to enhance the role of elementary school, namely: (1) school plays a very important role in providing understanding to children. (2) Disaster Risk Management Education and disaster preparedness in schools are very important aspects as part of the daily life of the school community. (3) Schools where most of their citizens are children are often seen as vulnerable people while they can actually play a role in disaster risk reduction. (4) Many elementary schools in the disaster-prone areas of Merapi have developed disaster preparedness schools. (5) The role of primary schools can be further enhanced by increasing the role of principals and teachers, implementing disaster education, empowering the role of schools in critical situations, mapping and determining the location of renewed evacuations.

1. Introduction

Strengthening preparedness is one of the elements of disaster management, which is very important to do in facing of disasters and emergencies. In natural disasters-prone areas, especially locations that are the center of many people's activities, preparedness is increasingly important to be established. This is because the occurrence of disaster is highly unpredictable [1]. The school is the location of the center of
activity where there are many people with a long duration of activity every day. If the school is located in an area prone to natural disasters, there is a possibility of disasters during activities at school. The disaster risk faced by schools is getting bigger because students, as the highest number of school citizens, are included in the vulnerable age. This condition shows that preparedness as the first step for safety management in schools is very urgent to be applied in schools in disaster-prone areas. Safety management in schools is an essential aspect to ensure protection for all students, teachers and other staffs from the risks and dangers of the school environment [2].

With the risk of disasters faced by schools in disaster-prone areas, schools’ responsibility becomes increasingly large in protecting the safety of their citizens. Schools are responsible not only in teaching knowledge about the disaster management but also providing services through the provision of evacuation shelter. If a disaster occurs during school hours, the school must consider the risks faced by students and provide a prior response [1]. On the other hand, in a wider scope, schools as educational institutions also play a role in building resilient communities by introducing the disaster risk reduction to students since the beginning. Because students are the ones who transfer knowledge quickly from school to their families and communities, early empowerment of child to understand disaster risk reduction is very useful in achieving that goal. In this case, schools and communities can collaborate in building networks in increasing disaster resilience. The school-community collaborative network can provide active and needed support for the school while also providing mutual benefits to the other stakeholders in the network [3].

In disaster-prone areas in the southern slope eruptions of Merapi, there are many schools ranging from elementary school to high school. Primary schools have the most number. Central Statistics Agency (BPS) Sleman shows that there are 30 elementary schools in the villages are located in disaster-prone areas Vulkan southern slopes of Merapi, in which 12 schools with 1,762 students in Turi District [4], 12 schools with 1,490 students in Pakem District [5], and 6 Schools with 912 students in Cangkringan District [6]. By paying attention to the volcanic activity of Merapi which continues continuously with an average eruption every 1 to 7 years [7], these schools still face the potential for catastrophic eruptions in the future. In the 2010, the eruption was mentioned as the biggest eruption event in the last 80 years [8], the areas in the southern slope were the most affected areas of eruption. Based on the map of the 2010, Merapi Disaster-Prone Areas and the Affected Area Eruption, it is known that the southern slopes of Merapi, some of which are even included in areas which are directly affected by the 2010 eruption. These impacts included casualties, settlement damage, infrastructure damage, and burning vegetation [9].

With the potential danger, schools in the disaster-prone areas of the Merapi eruption and schools in other regions need to improve preparedness in facing disasters. Schools need to develop a disaster management system as a basis for taking action in emergencies and disasters. For example, in 2018 the volcanic eruption experienced an eruption, which was initiated by phreatic eruption on 11 May 2018 followed by magmatic eruptions [10]–[12]. There is a possibility that an eruption occurs during school activity. Under these conditions, the school must be able to respond appropriately to ensure the safety of students, teachers and staff. However, there are only five schools that have implemented disaster preparedness, which located in disaster-prone areas, the southern slope of Merapi [13]. Other schools are also encouraged to implement the SSB program [14]. As the number of primary schools is the highest among all, the roles of primary schools need to be improved in order to implement the procedures of disaster preparedness in school properly. If schools can implement all-hazards management approaches by comprehensively organising practical environmental preparedness, software plans, and disaster drills, then injuries, deaths, and property damages can be reduced and school knowledge to disasters can be successfully enhanced [1].

This paper aims to identify how to enhance the roles of schools in establishing preparedness in dealing with disasters, both within the school and school-community collaboration. Through a review of various literature and data sources, the paper also tries to present information on the implementation of disaster management in schools through disaster preparedness schools (SSB). In addition to a review of various literatures, the paper also provides an example of the implementation of theory in an effort to
increase the roles of schools in developing preparedness for sustainable disasters, especially for schools on the southern slopes of Merapi which have yet to implement the disaster preparedness.

2. Developing Sustainable Disaster Preparedness in School: A Review

Disaster threats, especially natural disasters are often unavoidable. However, the disaster risk can be reduced by conducting a good disaster management. In Indonesia, the implementation of disaster management has been mandated and regulated in the Law of the Republic of Indonesia Number 24 of 2007 concerning Disaster Management [15]. There are several activities in the disaster management cycle, including mitigation and improvement of preparedness carried out in the pre-disaster phase. Mitigation is the initial stage while preparedness is the next stage [16]. An important part of this stage is education and understanding of disasters and actions that can be taken to reduce disaster risk.

Wang [1] explains that schools play a very important role in providing understanding of disasters to children. Through education, the concept of disaster management can be cultivated to children so that it is possible to establish a correct understanding of disaster management from an early age. Thus, the disaster management skills of the community can be improved ultimately. Currently, disaster management education is a global trend. One of the countries that have implemented disaster management in schools is Taiwan. In that country, disaster risk reduction and prevention programs have been implemented since 2003. It was initiated by a pilot program of implementation of educational technology in disaster management within the period of 2003-2006. Then, it was followed by the educational technology research and experiment program in disaster management within the period of 2007-2010. Within the period of 2011-2014, the experimental program and the establishment of disaster management network in schools were implemented. Lastly, the program for the preparation and enhancement of disaster risk prevention and reduction in schools and climate change education in 2015-2018 was conducted.

Disaster management education and disaster preparedness improvement in schools are very important aspects as a part of the daily lives of school members, especially those that located in disaster-prone areas. One example of the importance of the school's role in dealing with disasters is shown by Mutch [17] which is based on the experience during the earthquake in New Zealand during 2010-2011. The earthquake at magnitude 7.1 occurred on 4 September 2010 in Canterbury, New Zealand, which was followed by more than 12,000 aftershock for more than three years. Some of them were at magnitude 6. In disaster emergencies, schools had showed some importance roles both as community hubs in emergency response and in post-disaster recovery. At that time, many people were evacuated in schools that were not damaged and had a large hall with a kitchen and bathrooms. Next is the role of the principal and teacher in emergency response and recovery. The school principals and the teachers became companions for the community in dealing with disasters including in post-disaster mental recovery. Schools also played a role in supporting emotional recovery for the staff and students. Meanwhile, Hoffmann and Muttarak, [18] based on their experiences in Thailand and the Philippines, it showed that education played a role in improving preparedness for households that had not been affected by disasters previously. Education improves reasoning and anticipation so that those who are educated can do prevention without experiencing the disaster before they start learning.

In developing disaster management in schools, there are several things that need to be prepared. Based on the experience of sustainable school disaster preparedness from primary schools in Banda Aceh, it is known that 56% of primary schools in Banda Aceh are exposed to high tsunami risk. However, the most external of school disaster preparedness activities are not continued due to lack of ownership, institutional arrangements and funding. Thus, there are some important things to reactivate school disaster preparedness activities. These important things include annual school plans and school budgets for disaster preparedness. In the annual school plan, there are evacuation drills carried out at least once a year. The implementation of the plan must be supported by the local government policy to ensure the implementation in all areas that have some potential to be disastrous. The role of external parties is also very necessary in donating or providing physical equipment such as maps or evacuation routes. However, it is necessary to consider the material quality of the physical equipment so that it
complies with the national guidelines and the schools should be fully involved in the process of equipment maintenance [19].

There is a framework for comprehensive school safety. The three main themes of this framework are safe learning-facilities, school disaster management, as well as the education of disaster risk reduction and the increase of building capacity in dealing with disasters [1]. Processes carried out in developing disaster management in schools include [1]: (1) conducting assessments and plans, namely developing disaster management committees in schools, calculating the risk of vulnerabilities, capacities and resources, and formulating the emergency response plans and communication scheme for continuing the education, (2) actual and environmental protection, namely by carrying out disaster risk reduction actions that are implemented daily, (3) Developing the resilience in facing the disasters, namely by the preparation of standard operation procedures (SOPs), response measurements and prevention, and training programs, (4) conducting drill, monitoring and improvement. In Indonesia the concept of disaster management in schools has been implemented through the development of disaster preparedness schools (SSB). The Indonesian Consortium for Disaster Education [20] explains that SSB aims to build a culture of alertness and a culture of safety in schools and build resilience in facing the disasters. There are four parameters of school preparedness set for SSB. Parameters are the minimum standards that must be achieved in providing an educational response. The four preparedness parameters are as follows:

- **Attitudes and actions.** Based on this parameter, the SSB intends to build the ability of all school members, not only to be limited to students. The capabilities developed include individuals and collective capabilities to deal with disasters quickly and effectively. The indicator of this parameter is by gaining the knowledge of hazards, vulnerabilities, capacities, risks and history of disasters in the school environment. Another indicator is the knowledge about efforts that can be done in reducing disaster risk in schools; skills of school citizens in carrying out emergency response plans; socialization of disaster risk reduction knowledge, disaster preparedness school, and preparedness; there is training and integration of disaster risk reduction into the curriculum, and there are regular simulations and trainings involving the community.

- **School policy.** This parameter is a formal decision from the school regarding various matters in implementing disaster risk reduction specifically and integratedly. The indicator of this parameter is the existent of school regulations related to disaster risk reduction and access for all school components to the information, knowledge and training to improve the skills in dealing with disasters.

- **Preparedness planning.** It ensures the quick and effective actions in the event of a disaster. Planning is built by integrating the disaster management systems of the region and adapted them into the local conditions. In this parameter, there are various products namely in the form of disaster handling documents, preparedness SOPs, emergency response plans, and related documents as well as an early warning system. The indicator of this parameter is the existent of a document of disaster risk assessment that is consensually prepared among the school members and school stakeholders, action plans of the school, early warning systems, disaster management SOPs, evacuation maps, and evacuation sites.

- **Resource mobilization.** This parameter is tied to the resources to ensure the school preparedness for disaster including the human, facility, infrastructure and financial resources. Resource mobilization depends on the ability of the school. However, other stakeholders also have the opportunity to mobilize the resources to help the schools. The indicators of this parameter are there are school buildings that are safe from disasters, there are equipment and basic needs for post-disaster, there is a group from students' representatives, there is cooperation between teachers and MGMP, there is cooperation within the related parties such as BPBD, and there is regular monitoring of school preparedness and security.

UNESCO and UNICEF [21] explain that disaster risk reduction can be implemented in school curriculum. Based on case studies from Thirty Countries in various parts of the world, it is known that there are various methods in integrating disaster risk reduction into the school curriculum. Disaster risk
reduction in schools must be carried out systematically throughout the curriculum by paying attention to level. The materials presented include basic knowledge about hazards and the level of security as a basis for prevention, mitigation, vulnerability and ability to deal with disasters. Materials on disaster risk reduction can be integrated into subjects. Subjects included in the natural science are mostly used to deliver disaster risk reduction materials. 20 countries of 30 countries that were observed integrate disaster risk reduction into natural science groups which included Basic/General Science, Biology, Chemistry, Earth Studies, Earth and Life Sciences, Geology, and Physics. Other subjects that are also widely used as the media in delivering disaster risk reduction materials are the Social Science/Social Studies Cluster, Geography, and Language Clusters (Arabic, Bangla, English, English Literature, French, Nepali, Spanish, Spanish Literature). Other subjects are Civic and Citizenship Education, Health and Physical Education Cluster, Technology Cluster, Life Skill Cluster, Dedicated DRR Subject, Pre-military Education, Civil Defense, and Agriculture. There is also Third Country, which integrates disaster risk reduction into all subjects, though there are only two of 30 countries.

Furthermore, in integrating disaster risk reduction into the school curriculum, there are several approaches [21] namely the textbook-driven approach, the pilot project approach, the centralized competency based approach, the centrally developed special subject approach, the symbiosis approach, and the special event approach. The symbiosis approach is most widely used in various countries, namely in 11 countries. In this approach, the integration of disaster risk reduction is carried out through cross-curricular related to the development of social awareness and empowering individuals to active citizenship that have been mainstreamed. The next approach that is widely used in various countries is the pilot project approach, which is conducted in nine countries. This approach combines new production of multimedia, learning materials, training guides in developing teaching methods and instructor training. Pilot projects are often managed nationally. Other approaches that is still relatively less used are: (1) the centralized competency-based approach in five countries, namely through the central government agency in collaboration with stakeholders who identify the core material of disaster risk reduction to be included in the curriculum, (2) the special event approach in three countries, namely the existence of special disaster risk reduction events that affects the development of the formal curriculum, (3) the textbook driven approach in two countries, namely by incorporating disaster risk reduction material into revisions to school textbooks by the education ministry's curriculum in collaboration with institutions non-government, and (4) the centrally developed special subject (dedicate space) approach in two countries, which is characterized by the creation of new subjects that are separate and devoted entirely to disaster risk reduction learning.

The success of disaster risk reduction can certainly be achieved well through the roles of all school members. All school members play an important role in ensuring security at school. In Catalonia, based on the Spanish school law, principals are responsible for protecting school members. For adequate safety management the task of the principal needs to be supported by adequate administrative support, increasing time and resources, and improving staff training [2]. In addition, the principals also become the leaders in post-disaster recovery. The roles of the principals can also be supported by teachers, as it was similar to the one that happened in New Zealand [17].

The teacher is one of the parties who plays a very important role in the development of disaster preparedness in schools. The teacher has a leading role with the principal as the leaders in handling disaster and post-disaster emergencies. In addition, the teacher along with the principal also act as the companions for the community during a disaster and in post-disaster mental recovery [17]. In the context of disaster risk reduction education in schools, teachers are the main actors who play a role in teaching students about the disasters. Teachers can choose various learning models to cultivate the knowledge and skills related to disaster risk reduction to students. Based on experience from some third world countries, interactive learning and surrogate experiential learning models are the most widely used to deliver materials on disaster risk reduction. Other models that also used are active learning, field of experiential learning, inquiry learning, and affective learning. In improving teachers' role in learning optimally, it is necessary to develop teacher professional competencies related to disaster education. Some of the efforts that can be done in improving teacher competency are providing a guide to disaster
risk reduction to teachers, providing guidebooks accompanied by training, training of trainers, and training for teachers regarding the content of disaster risk reduction and pedagogy [21].

Besides the role of school principals and teachers in schools, disaster risk reduction can also be done through collaboration between schools and communities. In this collaboration, the school has an important role to build community resilience in facing the disasters. Efforts to build disaster resilience in the community are carried out through the school's main task of providing education, information sharing, and broader stakeholder networks. From the experience, the disaster risk in Aceh, the coasts of Banda Aceh and Aceh Besar, showed that the collaboration between schools and the community could be beneficial, which are the formation of networks that support the school itself and the mutual benefits for the community, especially for the stakeholders in disaster risk reduction [3].

3. Implementation of the Concept of School-based Disaster Preparedness (SSB) in Disaster-Prone Areas of Merapi Volcano: An Example

As explained in the previous section, school is one of the important elements in disaster management. However, it is common for schools to become objects affected by disasters. For example, during the eruption in 2010, many schools were damaged, especially in the ones located in the disaster-prone areas of Merapi eruption. In the Disaster Prone Area III (KRB III), which is an area with a radius of 0-10 km or which is located closest to the center of the eruption, there are five kinder garten (Taman Kanak-Kanak/TK) and six elementary schools that were severely damaged due to exposure to hot clouds. The condition of schools in the KRB III needed a total improvement or relocation. Meanwhile in the Disaster Prone Area II (KRB II) which is located within a radius of 10-15 km, the schools suffered mild to severe damage that required mild to severe or even relocating repairs, especially for schools located on the banks of the lava lane. In Disaster Prone Area I (KRB I) which is in a 15-20 km radius from the eruption center, the schools was not seriously damaged, yet many of them were exposed to eruption material including dust and sand [22].

The differences of the impact on schools located in KRB III, KRB II, and KRB I showed that there is a need for a different approach in improving disaster preparedness. In general, in eruption prone-area of Merapi, both KRB III, KRB II, and KRB I have developed disaster preparedness schools (SSB) as a solution to increase the role of schools in disaster risk reduction. In a broader scope, the development of disaster preparedness in Disaster-Prone Areas of Merapi Eruption has been carried out for a long time by involving various parties, including the Regional Government in Yogyakarta and Sleman District, National Disaster Management Agency (BNPB), Regional Disaster Management Agency (BPBD), community, researchers, and various other related institutions.

Why do we need to develop disaster preparedness schools? The idea of disaster preparedness schools is inseparable from the fact that disaster preparedness in schools is the lowest when it is compared that of settlements and communities. Meanwhile, it is very possible that disaster also occur in schools. In an effort to facilitate good and effective coordination and response in emergencies and disasters in schools, a disaster preparedness system in schools was developed. In disaster preparedness system in schools there should be command posts, evacuation areas, disaster management teams and their respective division of tasks, equipment, including simulation and preparedness practices. There is a clear description of responsibilities between principals, teachers, administrative staff, and various other parties involved in improving disaster preparedness in schools. With the existence of disaster preparedness schools, it is hoped that the goal of improving preparedness and culture can be achieved safely in schools and building the strength of each element of the school in disaster risk reduction [23].

The disaster preparedness in schools aims at increasing capacity and preparedness by including disaster material into supplementary subjects, teacher training, campaigns, and advocacy, and ‘school road shows’ for ‘simulation drill’ activities in schools. These activities have not been well coordinated and have not been integrated in a framework that can be mutually agreed upon. The mapping of educational activities in various disaster-prone areas in Indonesia as well as interventions and capacity building support for education is still minimal and concentrated in Java and Sumatra. The study of
community preparedness that has been carried out in various regions shows a low level of school community preparedness compared to the community with apparatus [24].

Sleman Regency has many schools that organize disaster preparedness schools (SSB), which consist of various levels between elementary and high school. Some of the disaster preparedness schools are located in eruption prone-areas of the Merapi. Based on the data derived from Sleman District Disaster Preparedness School shows that at the elementary level, there are some schools that have organized disaster preparedness in schools including SD Negeri 2 Tamanan, SD Negeri Bogem 1, SD Negeri Koroulon 2, SD Negeri Pencar 2, SD Negeri Cangkringan 1, SD Negeri Cangkringan 2, SD Negeri Umbulharjo 2, SD Negeri Gungan, SD Negeri Glagaharjo, SD Negeri Bronggang Baru, dan SD Negeri Srunen. At the junior high school (SMP) level, the only school that has implemented the disaster preparedness in schools is SMP Negeri 2 Cangkringan. While at the high school level, the schools that implemented the disaster preparedness in schools are SMK Muhammadiyah Cangkringan dan SMK Nasional Berbah. These schools have integrated the disaster preparedness material into subjects [25]. The data also shows the schools that have been developed by instilling the disaster preparedness in Sleman Regency, especially in the disaster-prone areas of Merapi, are mostly elementary schools. This condition shows that elementary schools have an important role in handling disasters. The role of elementary schools needs to be well managed and improved over time.

At the elementary school level, there are several methods of disaster education integration that have been carried out in several schools in the disaster prone-areas III of Merapi. The Integrasi of disaster education includes using newspaper as a medium of learning, inviting students to come to the object directly, as well as using media images and providing student worksheets about random words related to the eruption of Merapi. The strategy for integrating disaster education is very important to be implemented as students can build knowledge about disasters which can be practiced so that students gain the knowledge and skills in dealing with disasters. These knowledge and skills will then play a role in improving disaster preparedness. By using newspaper as a media, students work in groups to identify topics about disaster. The problem is that the topic of disaster is not a daily one written in the newspaper, yet it can be overcome by replacing it with online media. In the strategy of using real media objects, students observe directly the phenomena related to disasters and report in groups. This strategy turns out to increase student knowledge and reduce the gap between the knowledge provided by the teacher and direct practice in the learning process. Meanwhile in the strategy of using image media and random word worksheets, the integration between science subjects with disaster material was carried out. This method turns out to increase knowledge about the Merapi eruption disaster [26].

In general, disaster preparedness programs in disaster prone-areas III, II, and I, have made innovations in disaster risk reduction activities in schools, among others, by using Edmodo e-learning applications, disaster pictures, disaster videos, newspapers, and invite students to visit the real objects in disaster learning. Innovations are also carried out by disaster preparedness in schools in the early warning system. For example, in one of the disaster prepared schools, all of the teachers already possess radio communications that were used to monitor the condition of Merapi. Innovation is also conducted on early warning tools. Schools with disaster preparedness school have more than one early warning tool used to anticipate if the power goes out at the time of the disaster. In addition, schools with disaster preparedness have also collaborated with the Ministry of Education in disaster risk reduction activities in schools.

Until 2014, there were 14 schools with disaster preparedness located in the disaster areas of Merapi eruption. The conditions of their preparedness of these schools varied. Based on attitude and action indicators, school policies, preparedness planning, and mobilization, it turned out that not all schools with disaster preparedness in prone-areas of Merapi eruptions are included into the well prepared category. In disaster prone areas III, there were six schools with disaster preparedness categorized as ready and three schools as not ready. In disaster prone areas II, there was one school which was categorized as not ready. Meanwhile in disaster prone areas I, there was one school which was categorized as ready and three schools as not ready. This condition showed that in general, only half number of the total schools of the disaster preparedness in the volcanic eruption-prone areas of Merapi
had good preparedness in facing the eruption. Moreover, most of these schools were elementary schools whose students are in the age group which is more vulnerable than other levels.

The ineffectiveness of the development of disaster preparedness schools is inseparable from various obstacles in integrating Disaster Risk Reduction in education. Referring to the Indonesian Disaster Education Consortium [27], these obstacles include:

1. Human resources that have yet to meet the disaster risk reduction capabilities
2. Funding is unclear in its structure in integrating disaster risk reduction
3. Not all teachers are involved in disaster risk reduction
4. Schools only want to conduct the disaster risk reduction if there are clear instructions in the form of a decree (SK)
5. Lack of cooperation with outside parties
6. Lack of coordination with policy holders
7. Lack of teaching materials
8. The curriculum used is not in accordance with the risks in the area
9. The density of curriculum material also resulted in disaster risk reduction activities in schools not being implemented
10. School activities are too pack
11. Lack of socialization from the Government
12. Lack of coordination from the school and the school committee
13. Lack of commitment from teachers in disaster risk reduction

4. Some Suggestion to improve the Roller of Schools in Developing Sustainable Disaster Preparedness

In the paradigm of a disaster risk reduction, when the level of vulnerability is reduced and at the same time the capability of facing disaster is increased, it means that the risk of disaster will be reduced even though the danger that there is relatively constant. Schools whose members are children, have a high vulnerability to disaster risks, which means the risks are also high. However, if schools are able to reduce vulnerability and have good ability to deal with disasters, then the risk of disaster can be reduced. Conversely, school with the good ability to cope with disasters, it can also play an important role in disaster risk reduction in the community, as has been done in several countries [17], [19]. Preparing schools with disaster preparedness is one of the steps that has been taken in Indonesia to reduce the vulnerability and at the same time increase capacity in facing disasters in the school environment. Schools with disaster preparedness also provide disaster education from an early age so that in a wider scope, it can also play a role in increasing public understanding of disasters.

Schools with disaster preparedness conducting various implemented programs, can still continue to develop themselves to improve their functions in achieving the goals of disaster risk reduction. Learning from various experiences in various countries, there are various points that can be considered in increasing the role of schools, especially elementary schools in disaster risk reduction. Some of the points proposed to be improved in the Merapi disaster preparedness in schools are as follows.

1. Increasing the role of school principal

   The principal is the main determinant of policy in the school. Principals, in disaster-prone areas, have a greater role than those outside disaster-prone areas because they have to determine various policies related to disaster management, especially in critical situations. Regarding this, Vicario [2] gave an example that in Catalan, Spain, the principals as the highest representative of the educational administration in school are responsible for protecting all school members from risks and dangers. Principals have a greater role to: (1) ensure safety and health regulations and responsiveness in emergency situations, (2) pay attention to school infrastructure and do controlling, (3) show teachers and students about the use of resources, installations, and materials owned school correctly, (4) create a good learning environment, (5) create an atmosphere of involvement and dialogue in developing risk prevention procedures and strategies, (6) incorporate safety and health in the school curriculum. To achieve these goals well, it is needed to improve the
level of principal's training. The role of the principal is not only related to policy but also cooperating with the teachers in the implementation of disaster response and recovery. Referring to this information, the role of school principals in the disaster-prone areas of Merapi also needs to be improved from time to time. To reach the goals properly, it requires continuous training in the form of disaster management for school principals in the disaster-prone areas of Merapi. The condition of the principal was also very varied. Ozmen [28] indicated differences in responses related to gender, marital status, title, and work year. Marital status is decisive because the life of the principal basically consists of a mix between a professional career and his family. While work year is very influential on experience. The variety of experiences and reactions of elementary school principals in Turkey to earthquake show the influence of these aspects [29]. In increasing the role of the school principal these aspects need to be considered in order to achieve certain standards set.

2. Increase the role of the teacher

The teacher has an important role to teach students about disasters and their handling. In this regard the knowledge and skills of teachers related to disasters need to be updated and improved continuously from time to time. Changes that occur in the environment that allow changes in the level of disaster risk and its distribution need to be followed by updating teacher skills and skills regularly. Increasing and updating the skills and skills of teachers in the disaster-prone areas of Merapi also need to be done regularly. In addition to playing a role in teaching disaster management to students, teachers in the disaster-prone areas of Merapi must also be able to play an active role in handling critical and post-disaster situations as exemplified by Mutch [17] in handling earthquake disasters in New Zealand. Because disaster management is very complex, it is necessary to divide tasks and roles for teachers. The division of roles is carried out by taking into account the formation of teachers in elementary schools, including the number of teachers, the composition of gender, age, and educational background and certain skills mastered. Wang [1] explained that the teacher's ability along with the budget, equipment, and environmental conditions are related to school capability that determines disaster resilience and emergency evacuation management.

3. Implementation of disaster curriculum

The disaster curriculum must be associated with the type of disaster that is a threat and pay attention to environmental conditions in the area around the school. In the implementation of the disaster curriculum, it should be noted about teaching material development and implementation as explained by Wang [1]. In this case, it is important to check whether the school has actively set teaching materials for local disaster management curriculum and courses of school disaster management techniques. For elementary schools in areas prone to the eruption of Merapi, the implementation of this curriculum needs some attention. Not only limited to the existence of the curriculum, but also its implementation including the preparation of teaching materials and the implementation of local scale in their respective school environments. Disaster education is also highly recommended to be implemented in an integrated manner with health education. This is by considering the number of disasters that followed the development of certain diseases. The experience of eight major natural disasters in Indonesia is generally followed by an outbreak of infectious diseases. For this reason, it is very important to have health education in schools and community-based disaster risk reduction planning including information dissemination to create a resilient community. The catastrophic eruption of Merapi is one of the major natural disasters which is followed by the development of an infectious disease outbreak [30].

4. Empowering the role of the school in facing emergencies

Schools are an important part of handling disaster emergencies. Mutch [17] had exemplified the role of schools in handling earthquake disasters in New Zealand. Schools can act as community hubs in disaster response and recovery. Schools that have buildings with good construction and large capacity can also be used as shelters in handling disaster emergencies. This role can also be used by elementary schools in disaster-prone areas, especially disaster-prone areas I, which are located further than the eruption center. For schools located in disaster prone areas III, this role
cannot be implemented because the area must be emptied from community activities starting from alert status. The school environment can at least be useful as a temporary evacuation location or gathering point in the evacuation process.

To empower the role of the school there are many aspects that need to be prepared. These aspects need to be concerned is respects to elementary schools in areas prone to the eruption of Merapi if they want to develop the functions in helping disaster management for the surrounding environment. Wang [1] explained that for schools that function as temporary evacuation shelters, the stock of supporting resources, the number of people evacuated, the scope of the community served, and the condition of evacuation shelters should be taken into account. Meanwhile, Shah et al. [31] explained that schools must pay attention to the four pillars of preparedness in the face of disasters, namely emergency planning, preparation measures, safe school facilities, and hazard education and training. The experience of school preparedness in facing the floods in Pakistan showed that there were some shortcomings, among others continuity of school operation after disaster, maps availability to identify evacuation routes, availability of equipment and emergency resources, instructions for disaster preparedness, as well as psychological first aid and counseling. These aspects can be a reflection of elementary schools in areas prone to the eruption of Merapi.

The part that is still relatively lacking in attention is the one that deals with students with disabilities [31]. As a result, there is an increase in vulnerability both physically, psychologically and education. So far, children with disabilities are still less involved in disaster risk reduction. Even though they can also play a role in disaster risk reduction, among others (1) through school-based disaster education, (2) promoting children's involvement in responding to disaster, and (3) increasing their involvement in disaster recovery and the recovery of surrounding people. Broader opportunities for children with disabilities in disaster risk reduction initiatives will increase the participation and capacity to face and contribute during emergencies and disasters [32].

5. The Mapping the school environment and updated evacuation planning determination

One of the most important parts of disaster risk reduction in schools is mapping the school environment and mapping the regional environment to identify the resources needed in disaster management such as hospitals, police stations, government offices, etc. Mapping the school environment and determining evacuation planning is a guideline in implementing disaster management. Regarding this matter, schools in areas prone to the eruption of Merapi, not only provide maps and evacuation sites, but also need to renew them from time to time especially if there are changes in the surrounding environment that affect the evacuation process such as changes in spatial settings, construction of new buildings, and so on. Further, Wang [1] explained that the disaster management map must also be ascertained that it is understandable, contemplated, and informative. This map serves as a guide for teachers and students to evacuate during emergencies at school. Some things that must be included include potential hazards, evacuation information, and resources for disaster management. Emergency plan preparation is followed by preparation drill [2] as an integral part. Beside routine simulation of disaster evacuation drills at schools, teachers and students are also encouraged to practice at home [33]. Making maps and determining evacuation locations can be done by involving students [34]. This is important because students’ involvement is also a form of learning to equip them with the knowledge to understand and memorize the school environment and school planning that have been determined.

Furthermore, it takes synergy from all lines to build preparedness in elementary schools. To play an optimal role the school does not only stand alone but certainly requires support from various parties involved. Learning from experience in Aceh, Indonesia, schools in disaster management activities need to get support from the government through the Ministry of Education, universities through study centers, NGO, the private sector, the media, and the community. The last three groups mentioned before, have yet to be seen their role in supporting disaster management in schools in Aceh [3]. In the disaster prone-areas of Merapi, it is very important to get support from all these stakeholders. In an effort to support the role of school, there are things to do, among others: (1) the readiness from each school for
disaster preparedness in any disaster-prone areas is the initial point to improve preparedness and to anticipate the threat of eruption of Merapi, (2) the activeness of all school residents is needed so that disaster risk reduction activities can be realized and can improve school community preparedness, (3) the perfection of disaster curriculum which is adapted to disaster-prone areas, (4) the financial support from related institutions, (5) workshop and training for teachers, school residents related to disaster to be able to foster enthusiasm and initial awareness of disaster preparedness, (6) the evaluation of the disaster preparedness implementation in schools by related Ministry so that the advantages and disadvantages of implementing disaster preparedness schools can be found, (7) the improvement of cooperation of all institutions such as BNPB, BPBD, the Ministry of Education, Local Governments, NGO, or related institutions.

5. Conclusion

Merapi as an active volcano still holds potential disasters in the future. Elementary schools in the disaster-prone areas of Merapi need attention in disaster management because of their distribution in various parts of disaster-prone areas and their members which are dominated by children as vulnerable groups. Instead of being the most vulnerable party, elementary school can actually be an important element in disaster risk reduction. In areas prone to the eruption of Merapi, many schools have developed the concept of schools with disaster preparedness. In increasing the role in disaster risk reduction to be better, there are several things that need to be considered to be managed optimally and improved their functions, namely increasing the role of principals and teachers, implementing disaster education, empowering school roles in emergencies, as well as mapping the school environment as evaluation guidelines.

This paper is still a review of various studies that have been published to formulate several important aspects that are suggested to be a concern for efforts to optimize the role of primary schools in disaster risk reduction of Merapi eruption. Furthermore, research needs to be done to obtain complete and accurate information about how the efforts have been made in elementary schools. This kind of research is needed to support more practical goals in improving the role of elementary schools.

References


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