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Strengthening Disaster Literacy as An Effort to Reduce The Risk of Disaster in D.I. Yogyakarta Society

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Abstract: This research aims to find out how to optimize GLS in building awareness of disaster literacy, the role of families in GLS to encourage the disaster literacy movement, and opportunities to strengthen disaster literacy in the digital era. The research subjects are the society and schools in D.I. Yogyakarta area. The research method used is literature study, data collection techniques are carried out by reviewing several books, literature, and other documents that are appropriate to disaster literacy studies. The results showed that optimizing the school literacy movement directed towards disaster literacy awareness can increase public understanding, disaster preparedness and can reduce the risk of disasters that will cause material and non-material losses. The strategy and pattern of implementing the school literacy movement includes three stages, namely: habituation, development, and learning activities. The role of the family will contribute to disaster literacy that can provide experience and knowledge of the society according to the conditions of the residence. Technological advances are also able to contribute to the society as literacy materials and provide information quickly and accurately related to natural disasters.

1. Introduction

The threat of disasters in Yogyakarta is still frequent, especially geological disasters such as floods, volcanic eruptions, landslides, and earthquakes. Yogyakarta is located between Mount Merapi in the north and the beach on the south side. Thus, the occurrence level of a disaster may be possible. Earthquakes often occur in Indonesia, especially in the Special Region of Yogyakarta (DIY). Seen from the map of earthquake areas in Indonesia, Yogyakarta is in region 4. This area is an area prone to earthquakes [6]. The last major earthquake occurred in Yogyakarta was on 27 May 2006 with a magnitude of 5.9 on the Richter scale. The earthquake centered on the bottom of the Indian Ocean with a depth of 33 km at the coordinates 8.26 ° latitude and 110.31 ° east longitude [9] . Based on BNPB data, the number of victims due to the earthquake reached 5,716 people died and 37,927 people were injured [3]. The earthquake caused many people being trapped in their homes, thus claiming more victims that were children and the elderly [15]. BMKG data published on the website [2] bmkg.go.id recorded that the last earthquake occurred in Yogyakarta on July 13, 2020 with a magnitude of 5.2 on the Ritcher scale centered at a depth of 10 km southwest of Bantul-DIY. Apart from the earthquake, Yogyakarta is also one of the cities affected by the existence of Mount Merapi.

Mount Merapi is one of the most active volcanoes in the world. Mount Merapi erupts in a cycle of 4 - 6 years [2]. The eruption cycle of Mount Merapi has changed. Data from the Geological Agency, Ministry of Energy and Mineral Resources accessed on August 5, 2020 [2], noted that the status of Mount Merapi is at level 2 (alert) since June 21, 2018. The largest eruption in the last ten years occurred on November 5, 2010 that resulted 346 people were died. Besides causing victims, the eruption of Mount Merapi had an impact on the housing, infrastructure, telecommunications, electricity and clean water sectors [14].

The disaster that occurred in Yogyakarta took a lot of losses from various aspects. Children are vulnerable to disasters due to their limited knowledge and understanding of disaster risks, besides that,

the lack of understanding regarding the actions that must be taken when a disaster occurs is also one of the causes. Based on data about the incidence of natural disasters in several areas, the average number of victims is children, both during school hours and outside school hours [21].

There is still a potential for disaster in the Special Region of Yogyakarta, especially erupting volcanoes with alert status for more than 2 years without any decline in status, so all parties must pay serious attention to minimize the impact of losses due to the disaster. The facts described above show that there are still many victims, both materially and non-materially, so it can be seen that disaster preparedness has not been prepared and understanding of disaster risk is still low. One of the efforts to reduce the risk of community disasters is to increase the capacity of disaster literacy to the community [16]. Currently, the disaster education is very needed. Research show that 79.43% of it stated that their families were not ready to face the disasters. They got 88.64% of the disaster information through their TV or the internet, and 12.89% stated that they got information through the learning was suitable with the scientific discipline [27].

The important thing that must be owned by the community is disaster literacy or community awareness efforts in dealing with a disaster. Disaster literacy is a key that must be possessed by the community so that they can fully understand the geographical location of their area in a disaster-prone area. Disaster education is one that can encourage the realization of a disaster resilient generation for the younger generation [7]. Disaster literacy is an effort to make people aware of a disaster that is very important to have. This is done in order to reduce the risk of disasters causing losses [16].

Based on the problems above, this study aims to solve problems related to the form of strengthening literacy as an effort to reduce disaster risk carried out through schools and communities in Yogyakarta. The initial assumption in this study is a form of strengthening disaster literacy resulting in increased efforts to minimize material and non-material risks and losses as well as technological opportunities in encouraging awareness of disaster literacy in D. I. Yogyakarta community.

2. Method
The research method used in this research is literature study. Literature-based research is a form of research that uses literature as the object of study. The subjects of this study include the community and schools in the Yogyakarta area. There are several main features that need to be considered in the literature study research method, namely: First, the author is faced directly with text/numerical data. Second, books and articles are interpreted as second sources, meaning that the writer obtains information from the second party, not original from the first party in the field. Third, the data/information obtained is "ready to use". Fourth, books and articles obtained are not limited by time and space [26].Data collection techniques are carried out by reviewing several books, literature and other documents considered appropriate to disaster literacy studies.

3. Results and Discussion
Optimizing the School Literacy Movement in Building Disaster Literacy Awareness
The School Literacy Program can be an alternative in developing disaster literacy awareness. When referring to the objectives of GLS, both general and specific goals, it is clear that the school literacy movement provides space in developing the character of students through cultivating the school literacy ecosystem to become lifelong learners. More specifically, GLS is also a forum for increasing the capacity of residents and the school environment so that they are able to process various kinds of information / knowledge that can support the students' lives in a sustainable manner [24]. At this point, it is very possible that the School Literacy Movement can become a reinforcer in building awareness of disaster literacy through the implementation of existing GLS strategies and models in schools.

Ideally, the practice of the School Literacy Movement is not limited to reading and writing activities. GLS must be an activity in the form of a combination of developing receptive and productive skills so that competences can be maximized. There are several gaps that can be optimized in developing awareness of disaster literacy through the implementation of GLS including habituation, development and learning activities. The results of the research done by Suraya, 2019 reveal that the implementation

of the School Literacy Movement has three stages, namely habituation, development, and learning activities. At the habituation stage, schools can design several strategies to create a literacy culture that can be integrated with disaster information content. For example, schools allocate15 minutes each day to read about disaster literature that is relevant to the potential threat of disasters in the school location and in the surrounding area. Schools can schedule reading time at the beginning, middle, or end of lessons, depending on the schedule and conditions of each school. This activity can be followed by an informal discussion about the references that are read so that there is a variety of communication related to the perception of disaster.

At the development stage, there is a great opportunity for schools to improve literacy skills related to disaster information by showing the involvement of students' thoughts and emotions through productive activities, both orally and in writing or as part of curricular activities. For example, holding a mini workshop related to disaster simulations that could potentially occur in the school area. This activity can be followed by short presentation assignments, simple writing, simple presentations, crafts, or acting to respond to reading, those are adjusted to the level and abilities of students so that the same perception will be built in the community in an effort to reduce the risk of disaster. Positive culture for critical, analytical, creative, and innovative thinking in reducing disaster risk can be transformed in a sustainable manner.

At the learning activities stage, it provides strategic opportunities for schools to integrate disaster literacy skills in all subjects, either directly or indirectly. Direct literacy activities can be carried out through integration into certain subjects relevant to disaster backgrounds. For example, the subjects of Social Studies and Sciences are very free to provide disaster content related to current natural conditions and phenomena through various relevant sources, such as maps of disaster-prone areas, weather forecasts from BMKG and others. For indirect literacy activities, it is possible to integrate disaster content in a broader perspective. For example, Indonesian Language subjects contain disaster content from folk stories, fairy tales, and novels so that they can provide positive values that can be applied in an effort to deal with disasters. Islamic Education subjects also have the same opportunity to integrate religious values in supporting human life, especially in dealing with various natural phenomena or disasters that are parts of human life. Through the pattern of the school literacy movement, optimization in building awareness of disaster literacy can be maximized.

The active role of academics can be the key to successful disaster mitigation. The active role of academics to go directly to society is one of the most effective efforts to strengthen disaster literacy, both for teachers and students [11]. Schools can transfer knowledge to students, while students can continue the information obtained in the world of education to their families or people around them [12]. The connectivity of various elements, both schools and the community can be an asset in increasing the capacity of the community in dealing with disasters. Furthermore, one of the important variables in disaster management is increasing the capacity of people living in disaster-prone areas [5].

Geologically, the special region of Yogyakarta is limited by two great potential disasters, namely Mount Merapi in the north and the Subduction Zone in the south, therefore integrated mitigation measures need to be taken. Understanding the characteristics of disaster sources is also very important in order to estimate the potential for disasters that might arise and to reduce the impact of disasters on the surrounding life and public facilities around the location. For example, the Yogyakarta earthquake occurred on 27 May 2006 can be used as a case study to conduct disaster mitigation studies due to the earthquake. This incident caused several educational facilities, social facilities, villages and other infrastructure (roads, mosques, bridges, electricity and water networks) estimated to be damaged by the earthquake [8]. Knowledge related to disasters obtained from literacy that has become a habit will help reduce the risk of disasters that causes losses. This is in line with a research by [1] showing that increasing disaster literacy can raise public understanding and disaster preparedness. This can be proved the increased awareness of the community accompanied by increased ability to identify and evaluate the factors and signs of disaster. In addition, the community can also understand well what to do according to the type of disaster being experienced. Disaster preparedness will help reduce risks and losses due to disasters.

The Role Of the Family in the School Literacy Movement to Encourage the Disaster Literacy Movement

The first and foremost environment in instilling education, personality, and moral values is family. Parents and families around the house will be examples as well as role models for children in the development process [10]. The family is the first institution that is recognized as circulation in the development of an individual's life. A person can get to know the world starting from family education, therefore the family is commonly referred to as the first and foremost educational institution. Family creativity at home will influence in building a literacy culture. A special attention is needed in developing children's literacy skills. For example, a collection of books at home can encourage children to have a literacy spirit [25]. Home is the best place to foster interest and develop reading habits, especially because of the family atmosphere that has been built since childhood. Through a comfortable and quiet place, children will easily gain knowledges and experiences quickly that can be remembered for a long time [23].

Literacy is not only taught through school programs but can be taught outside formal educationlike family. Most of the time the child has is with his family, so the family will be more able to control the child for activities that are more beneficial for them than school hours that on average only spend a quarter of the child's time. This is also supported by [18] in his research suggesting that the basic foundation of children is family. So, it is necessary to develop awareness of parents and people around them to understand and introduce literacy culture since childhood. This is stated on the basis of literacy habits that cannot be cultivated in a short time. Loving reading behavior is influenced by habits developed by the family. Argued that literacy can be started through the family. Family literacy practices depend on individual activities, which are influenced by the language used at home, household activities, values, and family aspirations. Literacy practice is also related to learning activities at school. Other findings show that family literacy practices are not hindered by economic conditions [19].

Reading habits built within the family will influence children to make reading as a necessity. Another thing families can do is to create a private library in the house. The creation of a library that is made attractively will help children to enjoy reading activities, even children can invite their friends to play in the home library. This is supported by a research [25] that the literacy culture of children will be influenced by the creativity of parents at home. Children's literacy skills will also be able to develop with a collection of children's books in the house. Parents who have the habit of reading fairy tales to children will provide a stimulus for children's development. This habit will increase the child's curiosity through the habit of asking questions. The type of story that parents choose will also affect children's knowledge, for example by telling history and events around the house, including disasters that have occurred and how to deal with them.

Children's reading habits that have been formed from an early age can also be directed into disaster literacy. Children's reading books can be added with knowledge or related to natural disaster mitigation. Disaster literacy is the capacity of each individual to read, understand, and use the information received and then follow instructions in the context of disaster mitigation, preparedness, response and recovery [4]. Literacy refers to the ability to read and understand information. Argues that disaster literacy is basically related to how living people in disaster-prone zones are able to access information, then they are able to interpret this information in the form of disaster mitigation practices. The habit of disaster literacy can be started or continued with literacy habits that children have had since in the family environment [8].

Knowledge related to disasters obtained from literacy that has become a habit will help reduce the risk of disasters that cause losses. This is in line with a research conducted by [1] showing that increasing disaster literacy can improve public understanding and disaster preparedness. This is proven in the increased awareness of the community accompanied by the increased ability to identify and evaluate the factors and signs of disaster. In addition, the community can also understand well what to do according to the type of disaster being experienced. Disaster preparedness will help reduce risks and losses due to disasters.

Opportunities for Strengthening Disaster Literacy in the digital era
The development of technology in the 21st century has grown rapidly and the progress that has been made is irresistible. Nearly all users can reach the benefits of current technological developments. In the context of education, technological advances can be used as a learning resource with unlimited access like literacy. Suggests that technological advances in education are factors in changing behavior in learning activities, learning resources, and learning technology. So, technological advances can be maximally utilized to launch the school literacy movement program by using applications that have been developed. The success of disaster literacy will be significantly influenced by the sustainability of the school literacy movement [17].

As a form of positive benefits that can be used in disaster literacy is disaster information that can be accessed more quickly and easily. The existence of applications from BNPB, BMKG, BPPTKG, and social media such as Twitter, Instagram, Facebook, can provide fast and accurate information. The use of technology as disaster literacy can reduce anxiety, unpreparedness, losses, and other disaster risks. Extensive and easily accessible literacy sources will help the community to obtain information related to disaster mitigation. The results of a research conducted by Kamil et al. [12] showed that the geographic literacy can increase people's understanding and knowledge of disasters by 91.6%. Encouraging students to be able to increase awareness and individual skills about caring for disasters in the surrounding environment can be started through disaster literacy for children [20].

Yogyakarta as a city that is prone to and has the potential to be hit by disasters such as earthquakes, volcanic eruptions, and tsunami must have the ability and knowledge in disaster mitigation. The application of disaster literacy within the family, community, and school will be a factor that affects disaster risk. Based on the results of the observations, it is still in a low level that teachers and students implement the application of disaster literacy. The current use of information technology can also be functioned as a means of providing learning experiences related to disaster literacy to students in order to have life skills in dealing with disasters. The use of information technology can be integrated with the required information literacy. This is in accordance with the preparedness put forward by Kent [13] that will help minimize the adverse impacts of a disaster through effective prevention, rehabilitation and recovery measures due to a disaster.

4. Conclusion
Based on research conducted the research results showed that optimizing the school literacy movement directed towards disaster literacy awareness can increase public understanding, disaster preparedness and can reduce the risk of disasters that will cause material and non-material losses. The strategy and pattern of implementing the school literacy movement includes three stages, namely: habituation, development, and learning activities. The role of the family will contribute to disaster literacy that can provide experience and knowledge of the society according to the conditions of the residence. Technological advances are also able to contribute to the society as literacy materials and provide information quickly and accurately related to natural disasters.

Acknowledgments

References

[1]   Afrian R., & Islami Z R 2019 Peningkatan potensi mitigasi bencana dengan penguatan kemampuan literasi kebencanaan pada masyarakat Kota Langsa. *Jurnal Pendidikan Geografi. 9251*, 132–143. http://journal2.um.ac.id/index.php/jpg/article/view/5313

[2]   BMKG 2020 *No Title* (Badan Meteorologi Klimatologi Dan Geologi). https://www.bmkg.go.id/gempabumi/gempabumi-terkini.bmkg

[3]   BNPB 2014 *Data dan Informasi Bencana Indonesia.* Badan Nasional Penanggulangan Bencana. http://dibi.bnpb.go.id/DesInventar/simple_data.jsp

[4]   Brown L M, Haun J N & Peterson L 2014 A proposed disaster literacy model. *Disaster Medicine and Public Health Preparedness*, *8*(3), 267–275. https://doi.org/10.1017/dmp.2014.43

[5]   Chieh Lee H & Chen H 2019 Implementing the Sendai Framework for disaster risk reduction 2015–2030: Disaster governance strategies for persons with disabilities in Taiwan. *International Journal of Disaster Risk Reduction*, *41.* https://doi.org/10.1016/j.ijdrr.2019.101284

[6]   Dwisiwi R S, Surachman, Sudomo J & Wiyatmo Y 2012 Pengembangan Teknik Mitigasi Dan Manajemen Bencana Alam Gempabumi Bagi Komunitas SMP DI Kabupaten Bantul Yogyakarta. *Prosiding Seminar Nasional Penelitian. Pendidikan Dan Penerapan MIPA, Fakultas MIPA, Universitas Negeri Yogyakarta.*

[7]   Hadiyati S & Hafida N 2018 Urgensi pendidikan kebencanaan bagi siswa sebagai upaya mewujudkan generasi tangguh bencana. *Jurnal Pendidikan Ilmu Sosial. 28*(2), 1–10.

[8]   Haifani A M 2006 Manajemen Risiko Bencana Gempa Bumi (Studi Kasus Gempa Bumi Yogyakarta 27 Mei 2006). *Seminar Nasional IV SDM Teknologi Nuklir.*

[9]   Hardjono I 2006 Hirarki Gempa Bumi Dan Tsunami (Aceh, Nias, Bantul, Pangandaran, dan Selat Sunda) The Hierarchy of Earthquake and Tsunami: The Cases of Aceh, Nias, Bantul, Pangandaran, and Sunda Staits. *Jurnal, Fakultas Geografi, Universitas Muhammadiyah Surakarta*, *Vol. 20*, *N*, 135–141. http://hdl.handle.net/11617/258

[10] Inten D N 2017 Peran Keluarga dalam Menanamkan Literasi Dini pada Anak Role of the FamilyToward Early Literacy of the Children. *Jurnal Pendidikan Anak Usia Dini. 1*(1), 23–32. https://doi.org/10.29313/ga.v1i1.2689

[11] Izumi T, Shaw R, Djalante R, Ishiwatari M & Komino T 2019 Disaster risk reduction and innovations. *Progress in Disaster Science*, *2.* https://doi.org/10.1016/j.pdisas.2019.100033

[12] Kamil, Puspita A, Utaya S, Sumarmi & Utomo D H 2020) Improving disaster knowledge within high school students through geographic literacy. *International Journal of Disaster Risk Reduction*, *43.* https://doi.org/10.1016/j.ijdrr.2019.101411

[13] Kent R 1994 *Kesiapan bencana II. Program Pelatihan Manajement Bencana.* Banyuwangi:DHA-UNDIP.

[14] Marhaento H & Kurnia A N 2015 Refleksi 5 Tahun Paska Erupsi Gunung Merapi 2010: Menaksir Kerugian Ekologis Di Kawasan Taman Nasional Gunung Merapi. *Geoplanning: Journal of Geomatics and Planning*, *2*(2), 69–81. https://doi.org/10.14710/geoplanning.2.2.69-81

[15] Maidaneli 2019 *Kesiapsiagaan Sekolah Dasar dalam Menghadapi Bencana Gempa Bumi dan Tsunami Di Kecamatan Pariaman Tengah Kota Pariaman.* Skripsi Thesis, Universitas Negeri Padaang.

[16] Marlyono S G & Pasya G K 2016 Peranan Literasi Informasi Bencana Terhadap Kesiapsiagaan Bencana Masyarakat Jawa Barat. *Jurnal Geografi.* 16, 116–123. https://doi.org/10.17509/gea.v16i2.4491.g9968

[17] Masitoh S 2018 Blended Learning Berwawasan Literasi Digital Suatu Upaya Meningkatkan Kualitas Pembelajaran dan Membangun Generasi Emas 2045. *Proceedings of The ICECRS*, Volume 1 No 3 (2018) 13-34. https://doi.org/10.21070/picecrs.v1i3.1377

[18]   Prasetyo E 2016 Keluarga Literat dan Orangtua Mendongeng. *Majalah UNESA*.

[19]   Suatengco R T & Florida J S 2018 Family literacy in a low-income urban community in the Philippines. Journal of Early Childhood Literacy, 20(2), 327–355. https://doi.org/https://doi.org/10.1177%2F1468798418766604

[20]   Suharini E, Meliana D, Sanjoto T & Kurniawan E 2020 The Strategy of Disaster Mitigation Literacy through Problem-Based Learning (PBL) in the School Prone to Tidal Floods. https://doi.org/10.4108/eai.18-7-2019.2290156

[21]   Sunarto N 2012 *Edukasi Penanggulangan Bencana Lewat Sekolah*. BPBD. http://bpbd.banjarkab.go.id/?p=75

[22]   Surono, Jousset P & Pallister J 2012 The 2010 explosive eruption of Java's Merapi volcano—A '100-year' event. *Journal of Volcanology and Geothermal Research*, *241–242*, 121–135. https://doi.org/10.1016/j.jvolgeores.2012.06.018

[23]   Tampubolon 1993 *Mengembangkan Minat dan Kebiasaan Membaca Pada Anak*. Angkasa.

[24]   Wiedarti P, Laksono K & Retnaningdyah P 2016 *Desain Induk Gerakan Literasi Sekolah. Menengah, Direktorat Jenderal Pendidikan Dasar Dan Kebudayaan, Kementerian Pendidikan Dan Kebudayaan.*

[25]   Yulianingsih W 2016 Peran Pendidikan Keluarga dalam Literasi Anak.*Jurnal Pendidikan Anak Usia Dini*. 1(1). 23-32. https://doi.org/10.29313/ga.v1i1.2689

[26]   Zed M 2003 *Metode Penelitian Kepustakaan*. Jakarta:Yayasan Obor Indonesia.

[27]   Zhang D, Zhu X, Zhou Z, Xu X, Ji X & Gong A 2020 Research on Disaster Literacy and Affecting Factors of College Students in Central China. Disaster Medicine and Public Health Preparedness, 1-7. doi:10.1017/dmp.2020.33