The analysis of landslide preparedness on senior high school students in Karanganyar regency, central Java

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Abstract. Preparedness is a part of the disaster management process. It is closely related to the risks emerged by disasters. Landslide is a routine disaster which always occurs every year in Karanganyar. The research is set to determine the preparedness of landslide of Senior High School students in Karanganyar. It is descriptive qualitative research using survey method in collecting data. The results reveal that the percentage of students who have good preparedness in facing landslide is still very low. It can be seen from the percentage, 25.5% of students are less ready and 21.8% of them are even not ready. Conversely, 3% of students are very ready and 18.8 of them are ready, while 30.8% of other students are almost ready. This case shows that the capacity of Senior High School students in Karanganyar is still very low in facing landslide which occurs almost every year in Karanganyar.

1. Introduction
Indonesian territory is crossed by zero degrees latitude or equator. Regarding the division of climate in the world, the area crossed by the equator has a tropical or hot climate. It means the area gets more solar radiation than areas that are not crossed by the equator. Having such a hot or tropical climate, the division of seasons in Indonesia only consists of two seasons, namely the rainy season and the dry season [1]. The existence of these two seasons is characterized by changes in temperature, weather, and quite extreme wind. Besides, the land of Indonesia is very fertile because of its topographic conditions where the surface and the rock are diverse, both physically and chemically [1]. On the contrary, this condition can cause some adverse consequences for humans, for instance, the occurrence of hydro-meteorological disasters such as floods, landslides, forest fires, and droughts [2].

Human knowledge about the environment varies in various levels. It can negatively affect the natural environment if human has no or little understanding about environment [3]. Along with the development of time and increasing human activity, environmental damage tends to get worse and trigger an increase in the number of occurrences and intensity of hydro-meteorological disaster [4] (floods, landslides, and droughts) which occur alternately in many regions in Indonesia [5].

Based on data from the Indonesian National Board for Disaster Management/BNPB, there have been 1,304 disasters ranging from 01-01-2019 to 31-03-2019. There are 649,654 affected victims, 367 people die and disappear, and 1,385 people are injured. This disaster causes damage to existing houses and public facilities[5]. The largest number of disasters is in Java, especially Central Java.

Karanganyar is one of the districts located in Central Java which has a considerable vulnerability to natural disasters such as landslides, hurricanes, floods, fires, land movements, collapsed houses, and past accidents[6]. Based on the data released by the BPBD Karanganyar Regency from January 1, 2018,
until December 31, 2018, there are 213 natural disasters with 864 affected victims with the highest number of victims are landslides, hurricanes, and fires [5]. Landslides become quite frequent in Karanganyar Regency as data stated by the Karanganyar BPBD during the past year, namely in 2018 there are 93 landslide events with 115 affected people [5].

Karanganyar is one of the districts in Central Java classified as a landslide-prone location; 34 points in 8 sub-districts in Karanganyar district have been identified as prone to landslides. One factor that affects the stability of the slope is rain. Rain with high intensity (\( > 100 \text{ mm/day} \)) can trigger landslides. This is because rain water is infiltrated into the ground causing the process of soil saturation so that the soil mass increases [7].

Regarding the BNPB data and the news above, it is shown that karanganyar, especially Karangpandan and Kerjo Villages, is a region that has a high level of disaster risk, reflecting on previous landslide events and also looking at the condition of the region. Both in terms of topography, land use, and rainfall intensity occur [8].

The level of disaster risk is determined by the disaster potentiality as well as influenced by preparedness in facing the disasters [9]. The high risk of existing natural disasters can be reduced by increasing the capacity of affected victims [10]. The role of society is very significant in reducing disaster risk [11]. This is due to the same threats and dangers. If the capacity of the affected victims can be increased, the risk is ensured to be able to reduce [12]. It is in line with the general guidelines for Disaster Risk assessment published by BNPB in determining the disaster risk index by combining the hazard index, vulnerability, and capacity [5].

One effort to enhance the society capacity in facing long-term disasters is by improving disaster preparedness[10]. Increasing disaster preparedness will indirectly increase the capacity of affected victims [12]. The society is required to understand the knowledge of disasters and preparedness for disasters that will occur in their regions [14]. Many people do not know the level of risk and threat of disasters in their area. Knowledge of the symptoms of the surrounding disasters is important in community preparedness for disasters [5].

According to Carter, (1992, p. 29) preparedness is "an action that allows governments, organizations, communities, and individuals to be able to respond to a disaster situation quickly and effectively [13]. Designing disaster management plans, resource maintenance, and personnel training include preparedness actions" [14].

Preparedness is the basis of efforts to reduce the disasters risk. Disaster preparedness must be measured so that it can be seen how the level of preparedness of the community in dealing with the possibility of disasters in their environment [10]. This is confirmed by UNDP / UNDRO (1992, p. 68) [15]

Disaster education is an education that is important for people's lives, because disaster is an event that has many negative impacts on human life [16]. Even though in a certain area there is absolutely no potential for disasters, disaster education must still be applied, because it does not rule out the possibility of disasters coming anytime and anywhere [17].

School is a part of the community group which has an important role in reducing disaster risk by enhancing capacity [18]. The school has an important role in improving students' preparedness because the students spend most of their time at school [19]. Besides, school is also a place with a high enough risk due to a large number of people who are in that environment. So reducing this phenomenon needs to enhance preparedness in facing disasters [9].

2. Methods
This research is Descriptive Quantitative which aims to describe something [20]. It is carried out by presenting systematic, factual, and accurate data regarding the events or facts contained in the field [21].

The research is conducted in April 2019 at the State Senior High School (SMAN) in Karanganyar. The researchers select three schools as the sample of the research. Then, the researchers take the tenth (X) grade of Social Science (IPS) in each school.
Disaster Preparedness Analysis employs parameters based on 5 preparedness parameters issued by LIPI-UNESCO (Indonesian Institute of Science-UNESCO) in 2016, as in Table 1 below:

**Table 1. Disaster Preparedness Parameters**

| Parameter | Variable |
|-----------|----------|
| Knowledge and attitude | - Knowledge
Understanding of natural disasters, environmental vulnerability, physical vulnerability, and important facilities for disaster emergencies
- Attitude
Attitude and concern for disaster risk |
| Policies, relevant regulations (Regional regulation and Decree) | - Types of preparedness policies to anticipate natural disasters.
- Relevant regulations (Regional regulation and Decree) |
| Emergency Planning | - Plans to respond to emergencies
- Evacuation plans, including locations and evacuation sites, maps, routes, and evacuation signs
- First-aid plan, rescue, safety, and security in the event of a disaster
- Plan for fulfilling basic needs
- Evacuation equipment
- Important facilities for emergencies
- Exercise and evacuation simulation |
| Mobilization Capacity | - Institutional regulations and command systems
- Communication and coordination between relevant stakeholders
- Technical Guidance and Material Provision of Human Resources |

*Source: LIPI-UNESCO/ISDR(2006)*

**Table 2. level of Preparedness**

| Index Value | Category |
|-------------|----------|
| 80 – 1000   | very ready |
| 65 – 79     | ready |
| 55 – 64     | almost ready |
| 40 - 54     | less ready |
| < 40        | Not Ready |

*Source : LIPI-UNESCO/ISDR (2006)*

3. Results and Discussion

Preparedness in facing disasters can be measured using preparedness parameters. Preparedness parameters are employed to simplify the measurement of individual preparedness. Based on the Disaster Preparedness Framework issued by LIPI and UNESCO [22], the preparedness of students in facing disasters can be measured by several parameters 1) Knowledge and attitude, 3) Emergency Planning, 4) Early Warning Systems, and 5) Resource Mobilization Capacity. The following are the results of research that has been conducted in three State Senior High Schools in Karangnyar Regency.

3.1. Landslide Preparedness of State Senior High School Jumapolo

Based on the results of the study, the preparedness of the State Senior High School Jumapolo students as a whole is almost ready with a percentage of 55%, while there are only a small percentage of students who are ready to face the landslide disaster. It can be seen in the score percentage of the following graph:
Based on the results of the analysis, the largest percentage of students’ readiness in Jumapolo is in the almost ready and ready class. This is influenced by several factors including:

1) The landslides that often occur in the students’ surrounding environment make them familiar with disasters and ready to face them.
2) The condition and position of the school that is in a slope or hilly area.

3.2. Landslide Preparedness of State Senior High School Kerjo
Based on the results of the study, the preparedness of SMA N Kerjo students as a whole is almost ready. Meanwhile, there are only a small percentage of the students who are ready to face the landslide disaster. This can be seen in the score percentage of the following graph:
Based on the analysis, the largest percentage of students’ readiness in SMA N Kerjo is in the almost ready class and the percentage of students who are ready and less ready in facing landslides. This is influenced by several factors including:
1) The landslides that often occur in the students' surrounding environment make them familiar with disasters and ready to face them.
2) Diverse dwellings and environmental conditions around schools that are quite vulnerable, as well as access to schools that pass through hills that is quite vulnerable to landslides.
3) The condition and position of schools that are in a slope or hilly area.

3.3. Landslide Preparedness of State Senior High School Karangpandan
Based on the results of the study, the preparedness of SMA N Karangpandan students as a whole is not ready. There are only a small percentage of the students who are ready to face the landslide disaster. This can be seen in the score percentage of the following graph:

![Figure 3. Landslide Preparedness of SHS Karangpandan](image)

Based on the analysis, the biggest percentage of students' readiness in SMAN Karangpandan is in the not ready and less ready class. This is influenced by several factors including:
1) The location of the school is in a fairly gentle slope and landslides are very rare,
2) The condition of schools that are already adequate in terms of facilities and infrastructure makes students careless and lacks of personal preparedness in facing disasters.

3.4. Landslide Preparedness of State Senior High School in Karanganyar
Based on the results of the study, the preparedness of the State Senior High School students in Karanganyar shows that most students are still in the almost ready category. Besides, there is only a small percentage (3%) of students who are ready to face landslides. This can be seen in the score percentage of the following graph:
The following is a comparison of students’ preparedness in facing landslides in each school:

In the graph above, it can be seen that the school which has the best preparedness compared to the other schools is SMA N Kerjo, while the school which has the worst preparedness is SMA N Karangpandan. It is marked by the "not ready" category as the highest percentage. This case is certainly inseparable from a variety of factors, especially on knowledge and attitude indicator because the school is one of the institutions that have a large influence on the attitudes and behavior of students, including Senior High School students.

In a school, the knowledge of preparedness given by teachers will affect the attitude of students in taking action when a disaster occurs. As stated by Notoatmodjo (2007) in Aprilin, et al (2018) that the increase of knowledge possessed by an individual will correlate with an increase in the behavior of the individual[1]. This case shows that in a school, teachers have an important role in providing knowledge about disaster preparedness because it will become the main reason for someone to carry out protection activities or preparedness efforts [13].
Preparedness Knowledge provided by the teacher must be relevant to the condition of the region so that the students have a better understanding of it. Ultimately, it is expected that it can improve their preparedness attitude. Based on the data above, it is revealed that SMA N Jumapolo has a higher level of preparedness compared to the other two schools. Even though, the three sub-districts where the school is placed have a moderate level of vulnerability [6]. Preparedness certainly cannot be separated from the occurrence of landslides in the Jumapolo, as stated by the Head of Jumapolo Subdistrict, Mr. Sri Suboko at SMA 1 Jumapolo. He said that almost every year, there are always landslides in four villages in Jumapolo, namely in Jumantoro Village, Kadipiro, Kedawung, and Giriwondo [7].

However, Karangpandan Subdistrict also includes as a potential area of landslides when there is rain with high rainfall and long intensity, along with several other sub-districts of Tawangmangu, Ngargoyoso, Matesih, Jatiyoso, and Jenawi.

Regional conditions greatly influence the knowledge and ways of thinking of society, including Senior High School students in the age range from 15-18 years. The age which a person's cognitive domain reaches a high level, namely making plans, deciding strategies and decisions, and problem-solving. The right plans and strategies must be taken when a landslide occurs, which is called an emergency plan, namely the stages of preparing effective and efficient actions during a disaster. [23]

It is in line with a statement stated by MPBI / UNESCO (2007) in Tirtana and Satria (2018), knowledge is always utilized as the beginning of an action and awareness of a person. So it is expected that the students have good preparedness by having maximum disaster knowledge capacity. The emergency plan is related to the evacuation, relief and rescue process to minimize the number of disaster victims [22]. For example, is by preparing emergency equipment in the form of items needed by the victim. It aims to reduce the impact they feel, such as first aid kits, flashlights, dry food, or food reserves, drinks, a collection of important telephone numbers, duplicate house keys, copies of important documents, and others [24].

For other parameters, related to policies or regulations concerning disaster, early warning systems, and resources mobilization. These are broader parameters, it means that these parameters emphasize government efforts along with institutions dealing with disaster issues (BPBD Karanganyar Regency) in making policies or regulations, for example, the prohibition on building houses in areas with steep slopes.

Karanganyar BPBD chief executive, Bambang Djatmiko states that the EWS (Early Warning System) had been installed in several sub-districts to increase disaster risk [15]. Early warning systems include warning signs and information distribution. However, the most important thing is a good system which can be understood by the community, so that the community knows what to do when there are warning signs of a fire [24]. In this case, the school also has an important role to make students understand the signs of disaster. It can be implemented by conducting simulations/training in schools, especially in SMA N Karangpandan, which currently has a relatively low level of preparedness. In 2017, monitoring of four villages is still carried out conventionally or because it does not have an early warning system (EWS) in Jumapolo [6].

Resource mobilization capacity also includes preparedness parameters because it relates to various existing resources to restore or prepare an emergency condition [22]. Parameters certainly include the planned authority of the institution, not by each individual. However, Senior High school students also need to be informed about this, so that they know the needed resources by individuals (themselves) and the surrounding community in their recovery efforts. Ultimately, they can take the right steps or actions when a landslide disaster occurs [7].

4. Conclusion
Preparedness is the basis of efforts to reduce disasters risk. The level of disaster is determined by the disaster potentiality and preparedness in facing disasters. The high risk of existing natural disasters can be reduced by increasing the capacity of the affected communities. The school which has the best preparedness compared to the other schools is SMA N Kerjo, while the school which has the worst
preparedness is SMAN Karangpandan. It is marked by the "not ready" category as the highest percentage.

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