

# Disaster Mitigation Education and Preparedness for School Children in Facing Drought Disasters in Bragang Village, Bangkalan

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**Abstract:** Drought is a frequent disaster in areas with low rainfall, including in Bragang Village, Klampis Subdistrict, Bangkalan Regency. This condition affects water availability, agricultural productivity, and students' daily learning activities. This study aims to analyze the effectiveness of drought disaster mitigation education in increasing the knowledge and awareness of students at SMPN 1 Klampis. Using a pre-experimental design with a one-group pretest-posttest approach, 50 students participated in socialization through interactive counseling, educational animated videos, and simple water conservation practices. Data were collected through questionnaires before and after the socialization activities. The results showed a significant increase in the average knowledge scores of students, indicating that mitigation education effectively improved understanding, preparedness, and water conservation behavior. This study concludes that early disaster education is very important for building a culture of preparedness, especially in drought-prone areas. It is recommended that similar programs be implemented regularly through collaboration with schools, local institutions, and the Social Services Agency to strengthen environmental awareness among students.

**Keywords:** disaster mitigation, disaster mitigation education, drought, pre-experiment, Bangkalan.

## Introduction

Indonesia has a high level of natural disaster vulnerability due to its location at the meeting point of three major tectonic plates and its tropical climate, making it prone to earthquakes, floods, landslides, and droughts (Pramono & Yusuf, 2015; Sudarti & Puspitasari, 2021). Droughts often occur during long dry seasons and have an impact on agriculture, the economy, and the quality of life of the community (Aini, 2022). According to BMKG (2024), there are three types of drought: meteorological, hydrological, and agricultural. In Madura, especially in Bangkalan Regency, hydrological and agricultural droughts commonly occur due to limited water sources (Sanjaya et al., 2024). Klampis District, especially Bragang Village, has dry soil and minimal irrigation, causing the

community to experience difficulties in accessing clean water (Firdaus et al., 2021). This complex and challenging condition is further exacerbated by the impact of climate change caused by environmental degradation (Nugraheni & Firmansyah, 2024). This shows the importance of water resource management and increasing public awareness of environmental conservation.

Bangkalan Regency on Madura Island geographically experiences drought almost every year. Klampis District, especially Bragang Village, has low rainfall, low water absorption soil, and limited irrigation systems, so that the community often has difficulty obtaining clean water (Firdaus et al., 2021). This condition highlights the need for water resource management and awareness of sustainable water management as part of drought mitigation. The impacts of drought include a

decline in social activities, conflicts over water, and reduced agricultural yields and household income, which encourage people to change professions. Therefore, active community involvement is important so that they are not only victims but also actors in disaster risk reduction.

Change in mindset regarding disaster preparedness must be accompanied by a proper understanding of mitigation. Based on Law No. 24 of 2007 and Government Regulation No. 21 of 2008 in Noor (2014), mitigation is an effort to reduce disaster risk through physical development, awareness raising, and community capacity building. Minhar & Aco (2021) emphasize that mitigation is carried out before a disaster occurs, while Rinjani et al. (2022) emphasize its purpose to minimize negative impacts. Therefore, the application of mitigation needs to be instilled early on through disaster education in order to foster public awareness and preparedness.

Adolescents are a group that is vulnerable to disasters due to their limited understanding of the risks around them. Therefore, early disaster education is important to foster knowledge, awareness, and the ability to protect oneself. Sukanto (2015) states that drought has a widespread impact on humans, animals, and plants, such as crop failure and clean water scarcity (Surya & Suwetha, 2021). This emphasizes the importance of early education and mitigation to reduce disaster risk. Knowledge is a major factor in shaping preparedness and awareness of disaster threats (Banna & Dewi, 2025), so improving children's understanding of mitigation is necessary to build an environmentally conscious generation. The importance of increasing understanding and resilience to disasters should be instilled in the community, especially from an early age when they do not yet understand what to do when unexpected disasters occur (Desfandi, 2014).

Education is a conscious and planned effort to create a learning environment that encourages the development of students' potential, which is necessary for individuals, communities, nations, and countries, so that a lack of quality education can have an impact on the quality of life of individuals in the long term (Mubarok et al., 2025). In addition, education can be an effective means of

reducing disaster risk by incorporating material on natural disasters as a compulsory subject for all students at all levels, especially in schools located in disaster-prone areas (Suarmika & Utama, 2017).

This study conducted disaster mitigation awareness activities for junior high school students in the affected areas as a form of drought mitigation education. This activity is in line with the BNPB program and Law No. 24 of 2007, which emphasizes the importance of disaster awareness to minimize the impact. In addition to increasing knowledge, this activity is expected to foster moral values and environmental awareness. Children need to acquire this understanding because they are highly vulnerable. Disaster awareness socialization has been proven effective in fostering environmental responsibility and community preparedness (Budhiana et al., 2023). Thus, drought mitigation education is an important strategy in improving students' understanding and awareness of disaster risks in their area.

## Materials And Methods

### Study area

This study was conducted at SMPN 1 Klampis, Bator, Klampis, Bangkalan. This school was chosen as the location for the study because it is located in an area experiencing water crisis or drought.



Figure 1. SMPN 1 Klampis, Bangkalan

### Research Design

This study used a pre-experimental research design with a one-group pretest-posttest approach to analyze students' knowledge of preparedness

for drought disasters. The pre-experimental approach is a genuine experiment because in this design, researchers can control all external variables that may influence the results (Sugiyono, 2021; Creswell & Creswell, 2018).

### Population, Sample, and Research Instrument

Population in this study were students of SMPN 1 Klampis, Bangkalan. The sample was selected using purposive sampling technique in grade IX with a total of 50 respondents. The inclusion criteria in this study were students who had never received education on disaster warning and preparedness. The instruments used in this study were educational videos on drought disasters and questionnaires. The questionnaire aimed to measure the variable of students' knowledge of preparedness for drought disasters. It was created by the researcher and was a modification of the questionnaire issued by LIPI-UNESCO/ISDR (2006). The questionnaire contained 20 questions compiled based on student preparedness parameters, including Knowledge (K), Emergency Preparedness (EP), Warning System (WS), and Resource Mobilization Capacity (RMC), using a Likert scale. The Likert scale is the most commonly used method in questionnaires to produce accurate and reliable data (Santika et al., 2023).

**Table 1.** Frequency distribution of respondent characteristics.

| Characteristics | Frequency (n) | Percentage (%) |
|-----------------|---------------|----------------|
| Age             |               |                |
| 15 years        | 25            | 50             |
| 16 years        | 25            | 50             |
| Gender          |               |                |
| Male            | 27            | 55             |
| Female          | 23            | 45             |

### Data Collection and Data analysis

Data collection technique used in this study was primary data obtained by distributing questionnaires to students at SMPN 1 Klampis. Data analysis in this study was conducted using SPSS Statistics software with several tests, namely statistical tests, data normality tests using the

Shapiro-Wilk test, univariate and bivariate analysis using the paired sample correlation test and t-test.

## Results And Discussion

### Normality Test

A normality test was conducted to determine whether the pretest and posttest data were normally distributed as a prerequisite for using the *paired samples t-test*. The results of the normality test are presented in Table 2 below.

**Table 2.** Shapiro-Wilk normality test results.

| Category | Shapiro-Wilk |    |       |
|----------|--------------|----|-------|
|          | Statistic    | df | Sig.  |
| Pretest  | 0,950        | 50 | 0,034 |
| Posttest | 0,958        | 50 | 0,075 |

Based on the results of the Shapiro-Wilk normality test, it is known that the significance value in the pretest data is 0.034, which means that the data is not normally distributed because the p-value is  $< 0.05$ . Meanwhile, the posttest data has a significance value of 0.075, so it can be concluded that the posttest data is normally distributed. Even though one of the variables does not perfectly meet normality. According to RifqiMulyawan (2023), the analysis can still be continued using the paired samples t-test because the sample size in this study is quite large ( $n = 50$ ), so the data distribution is considered to be close to normal according to the *Central Limit Theorem* principle. The research data is considered to meet the requirements for further testing to determine the significant difference between the pretest and posttest scores after the implementation of drought mitigation socialization.

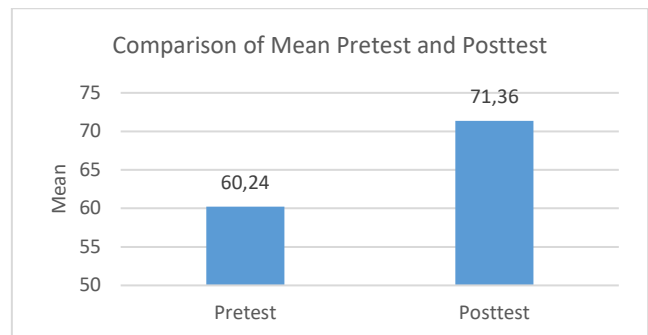
### Univariate Analysis

Descriptive analysis was conducted to determine the description of students' pretest and posttest scores before and after drought mitigation education, as presented in Table 3 below.

**Table 3.** Descriptive statistics of pretest and posttest.

| Category | Mean  | N  | Std. Deviation | Std. Error Mean | Minimum | Maximum |
|----------|-------|----|----------------|-----------------|---------|---------|
| Pretest  | 60,24 | 50 | 2,560          | 0,362           | 55      | 65      |
| Posttest | 71,36 | 50 | 2,155          | 0,305           | 67      | 77      |

Based on descriptive analysis, the average (mean) pretest score of students was 60.24, indicating that their initial knowledge of drought mitigation was still relatively low. The standard deviation of 2.560 showed a fairly homogeneous distribution of scores among students. After receiving education in the form of interactive counseling, educational videos, and simple water conservation practices, the average score increased to 71.36 with a standard deviation of 2.155. An increase of 11.12 points indicates a positive change in students' understanding after participating in drought mitigation education activities. The following graph provides a visual representation of the increase in students' knowledge scores.

**Figure 2.** Comparison of mean pretest and posttest scores.

### Paired Samples Correlation Test

Correlation analysis between the pretest and posttest scores was conducted to examine the relationship between the two measurements. The results of the correlation analysis are presented in Table 4 below.

**Table 4.** Correlation between pretest and posttest.

| Paired               | N  | Correlation | Sig.  |
|----------------------|----|-------------|-------|
| Pretest and Posttest | 50 | -0,053      | 0,715 |

Based on the correlation value between the pretest and posttest, which is -0.053 with a significance value of  $p = 0.715$ . A  $p$ -value greater than 0.05 indicates that there is no significant relationship between the pretest and posttest scores. This indicates that the difference in scores on the posttest is not due to a linear relationship with the initial scores, but rather due to the drought mitigation education intervention provided to students.

### Bivariate Analysis

Analysis of the difference between the pretest and posttest scores was conducted to determine the effectiveness of the drought mitigation education activities provided to the students. The complete results of the paired samples  $t$ -test are presented in Table 5 below.

**Table 5.** Result of the paired samples T-test.

| Paired               | Paired Differences |                |                 |                                           | t       | df | Sig. (2-tailed) |
|----------------------|--------------------|----------------|-----------------|-------------------------------------------|---------|----|-----------------|
|                      | Mean               | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference |         |    |                 |
|                      |                    |                |                 | Lower Upper                               |         |    |                 |
| Pretest and Posttest | -11,120            | 3,432          | ,485            | -12,095 -10,145                           | -22,908 | 49 | 0,000           |

Test results show that the difference in scores before and after the socialization is very significant. The t-value obtained is -22.908 with a significance level of  $p = 0.000$  ( $p < 0.05$ ). This means that there is a significant effect of disaster mitigation socialization activities on increasing students' knowledge. The 95% confidence interval range is between -12.095 and -10.145, which indicates that the increase in scores after the socialization occurred consistently across all respondents.

### Discussion

Educational activities are conducted by starting with a pre-test and ending with a post-test. Pre-tests and post-tests are conducted as a form of evaluation to obtain information about changes in knowledge related to the education that has been provided to students (Ashari & Firmansyah, 2024). Education using videos can be an effective strategy for providing information on preparedness. Education is conducted in schools because schools are the first place where students receive education, especially regarding disaster mitigation. Disaster mitigation education is conducted so that students are prepared to face disasters and can reduce the risks of such disasters (Setyaningrum et al., 2024).

Results of the study show a significant increase in students' knowledge after being given education on drought mitigation. The average pretest score of 60.24 indicates that students' initial understanding of drought risks and management is still low. After the socialization, the post-test score increased to 71.36, indicating that the socialization methods through counseling, educational videos, and simple practices had a positive impact on increasing students' knowledge. These findings are in line with the research by Amri et al. (2021), which states that disaster education can significantly improve students' preparedness.

Results of the paired samples t-test (bivariate analysis) reinforce these findings, with a p-value of 0.000 indicating a highly significant difference between the pretest and posttest. This shows that the increase in students' knowledge did not occur by chance, but was a direct result of the implementation of drought mitigation education. These results are in line with the findings of Ryan

et al. (2020), which state that disaster awareness campaigns can have a significant impact on increasing a person's preparedness. The main objective of preparedness is to minimize the effects of disaster hazards and ensure that available resources are used appropriately. Animated videos were chosen for disaster mitigation education because they have been proven to attract students' attention and improve their understanding of the steps to take before and after a disaster occurs. Animated videos have been proven to convey information in an interesting and easy-to-understand manner, thereby increasing students' interest and attention (Nurfalahi et al., 2025). Education through animated videos has been proven to be effective because it facilitates understanding, increases students' attention and interest thanks to attractive animated characters, and improves memory due to easily digestible visuals. Animated videos have the advantage of making the delivery of material more time and space efficient (Fathudin et al., 2025; Sari et al., 2025).



Figure 2. Treatment of students with educational animated videos

Audio- Audio-visual education can improve students' memory because it displays images, videos, animations, and audio that can increase students' knowledge. This media is also able to present information in a more interesting and interactive way so that students can understand the material more easily. The use of audio-visual media plays an important role in disaster mitigation learning to provide knowledge and preparedness for the actions that need to be taken before and during unexpected natural disasters to

minimize any impacts that may occur (Suwarni et al., 2024).



Figure 3. Educational animated video on drought

The pretest–posttest correlation results show an insignificant value of  $p = 0.715$ , indicating that the increase in posttest scores was not influenced by students' initial abilities but was entirely influenced by educational activities. This is supported by Kitagawa (2021), statement that mitigation must be carried out by increasing understanding and changing behavior before a disaster occurs. This shows that the education provided has been able to increase students' knowledge regarding disaster mitigation (Ashari & Firmansyah, 2024).

Knowledge about disasters in a person who is prepared is characterized by an understanding of the environmental conditions where that person lives. These conditions include knowledge about disaster events, disasters that may occur in the area, and the impacts caused by these disasters. Students are expected to know the actions that need to be taken during a disaster and how to respond to disasters (Saparwati et al., 2020).

The success of this outreach activity was also influenced by the age characteristics of junior high school students, who are in the stage of formal operational cognitive development. At this age, students find it easier to understand abstract concepts when accompanied by real examples or visualizations. The use of audiovisual media and water conservation practices proved to make it easier for students to understand the importance of drought mitigation. This is in line with Rifai (2018), statement and reinforced by Wulandari (2018), research that audiovisual media is very effective in improving students' understanding of disasters. In addition to increasing knowledge, drought

mitigation education also appears to be able to shape students' behavior in daily water management. Students become more aware of the importance of saving water and know simple steps to make water more usable.

## Conclusions

The results show that drought mitigation education has a significant effect on improving the knowledge of students at SMPN 1 Klampis. The increase in average scores from the pretest to the posttest indicates that socialization through interactive counseling, educational animated videos, and simple water conservation practices are effective in improving students' understanding of drought risks and management. Disaster mitigation education must continue to be integrated into school activities, especially in drought-prone areas. This program has the potential to build awareness, preparedness, and water-saving behavior from an early age, so that students can act as agents of change in their communities.

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