



Socialization of Natural Disaster Mitigation to Minimize the Impact of the Risk of Economic Loss in the Citarum River Basin (DAS) West Bandung Regency

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Abstract

Flood is the flow of water at the ground surface that is relatively high and cannot be accommodated by drainage canals or rivers, causing inundation in an amount that exceeds normal and causes harm to humans. This flood disaster usually occurs in the lowlands around rivers, especially rivers with various environmental problems such as factory waste, plastic waste, soil erosion, etc. One of the rivers that often experience these flood events is the Citarum River, the dirtiest river in the world. To reduce the impact caused by flooding, a Real Work Lecture (KKN) program was held by conducting community service regarding natural disaster mitigation training to minimize the impact of the risk of economic loss in the Citarum River basin, West Bandung Regency. The program is aimed at SMPN 1 Cihampelas students who are geographically close to the Citarum watershed. The method used is materialization regarding environmental problems in the Citarum watershed, the causes and effects of flooding and its prevention, and disaster mitigation carried out when a flood occurs. After conducting the materialization, students were asked to discuss and explain how to mitigate floods when they occur at the school. Based on the results of the materials and tests carried out, it was found that students succeeded in conducting presentations on flood disaster mitigation, understanding the causes and effects of floods and how to prevent them, and understanding the importance of preserving the environment, especially in the Citarum River basin.

Keywords: Flood, Mitigation, Citarum Watershed

1. Introduction

Disaster is a series of events that threaten and disrupt people's lives and livelihoods caused by both natural and/or non-natural factors and human factors resulting in human casualties, environmental damage, loss of property, and psychological impacts. Therefore, Law Number 24 of 2007 also defines natural disasters, non-natural disasters, and social disasters. According to data compiled in the Indonesian Disaster Information Data (DIBI)-BNPB from 2005 to 2015, there were more than 1,800 disaster events. 78% (11,648 incidents) were hydrometeorological disasters, and 22% (3,810 incidents) were geological disasters. One of the occurrences of hydrometeorological disasters is in the form of floods.

Flood is the flow of water at the ground surface that is relatively high and cannot be accommodated by drainage canals or rivers so that it overflows to the right and left and causes inundation/flow in an amount that exceeds normal and causes harm to humans. Floods are often known in 2 forms in the form of inundation in areas that are usually dry or not swamps, and floods result from water runoff from the river channel caused by the discharge of the river exceeding its flow capacity.

The Citarum River, located in West Java, has earned the title of one of the most polluted areas in the world. This 269-kilometer-long river has three main problems. In the upstream part of the watershed, critical lands often provide input for soil erosion. In 2013, Green Cross Swizerland and the Blacksmith Institute confirmed that the Citarum River is one of the world's most polluted and dirtiest places. The water flow along the river has decreased in quality due to a large amount of erosion and added contamination from livestock manure, household waste, and factory waste. Various toxic compounds also appeared in the Citarum watershed, which harmed the region and 35 million people in the 13 regencies/cities through which it passed. The rapid population growth and ongoing development have resulted in the Citarum watershed becoming increasingly degraded. It has been recognized that people along the river have a culture of disposing of waste that is not treated first. There have been several implementations of very good and quality programs from the West Java Provincial Government, such as "Citarum Vibrates (2000-2003)," a program focused on

pollution control, then "Citarum Bestari (2013)" with a program focused on alleviating water pollution problems and realizing water Citarum River Worth Drinking in five years. Furthermore, a new program was just released in 2018 and pushed directly by President Joko Widodo, namely "Citarum Harum". In essence, the entire program is carried out to restore and restore the Citarum watershed ecosystem so it can be in good condition.

Flood hazard maps can be used as a basis for flood disaster mitigation in the preparedness stage and for the reconstruction and construction of embankments or weirs in handling/reducing the threat of flooding. In mapping flood-prone areas, several stages of mapping should be carried out: review survey, semi-detailed survey, and detailed survey. Based on the flood vulnerability map that has been made, flood disaster mitigation can be done in 2 ways: engineering and non-engineering.

Therefore, efforts are needed in flood disaster management to reduce the adverse impact of each of these floods. The response effort is divided into three stages: the stage before the disaster occurs, the stage during the disaster, and the stage after the disaster. Then a community service activity (PPM) regarding flood disaster mitigation was carried out, which was given to students of SMPN 1 Cihampelas. The PPM activity is expected to provide several benefits, including Cihampelas 1 Middle School students knowing various environmental problems in the Citarum Watershed, Cihampelas 1 Middle School students understanding the causes and effects of flooding and its prevention, and Cihampelas 1 Middle School students understand how to mitigate natural disasters, especially floods. The objectives of the Integrative KKN-PPM are as follows: (1) Describe various environmental problems in the Citarum Watershed for students of SMPN 1 Cihampelas; (2) Provide an explanation of the causes and effects of flooding and its prevention for students at SMPN 1 Cihampelas; and (3) Providing knowledge about natural disaster mitigation, especially floods for Cihampelas 1 Middle School students. The benefits of Integrative KKN-PPM are as follows: (1) Cihampelas 1 Middle School students know various environmental problems in the Citarum Watershed; (2) Cihampelas 1 Public Middle School students understand the causes and effects of flooding and its prevention; and (3) Cihampelas 1 Middle School students understand how to mitigate natural disasters, especially floods.

2. Literature Review

Indonesia experiences natural disasters frequently, necessitating community and local government cooperation in disaster mitigation activities. Members of the community participate actively in the community protection unit. Natural disasters are incidents or a sequence of incidents that endanger, disturb, or affect human life and society due to natural and artificial forces and human factors. Natural catastrophes are brought on by the problem of environmental change brought on by environmental harm. In treating environmental sustainability, environmental harm caused by humans is also inextricably linked (Pramono et al., 2020). According to Hadi Purnomo and Ronny Sugiantoro (2010), 383 districts or municipalities out of 440 regencies or municipalities in Indonesia are vulnerable to natural catastrophes, which affect 87% of the country. Indonesia is also extremely vulnerable to natural disasters due to its enormous and unequal population, ethnic variety, religious and cultural practices, and class divisions. Natural disasters that frequently strike Indonesia, including earthquakes, tsunamis, floods, volcanic eruptions, landslides, and hurricanes, undoubtedly have devastating impacts and result in pain and loss for society and the nation (Fitriani et al., 2021).

According to a geological assessment, it is evident that Indonesia is an area where three huge plates, including Eurasia (Europe-Asia), Indo-Australia, and the Pacific Plate, are colliding (Puturu, 2015; Wahyuningtyas et al., 2019). Losses brought on by disasters are strongly correlated with the lack of awareness and preparation for dealing with low levels of readiness in terms of preparing for, avoiding, controlling, and defending against disasters that provide a threat of risk (Oloruntoba et al., 2018). The failure of disaster mitigation management results from the absence of community preparedness for disaster risk (Wahyuningtyas et al., 2020).

3. Materials and Methods

3.1. Materials

This KKN-PPM activity is located at the Bening Saguling Foundation which is in the village of Babakan Cianjur Rt 08 / Rw 04, Cihampelas Village, Cihampelas District, West Bandung Regency, West Java. while disaster mitigation counseling activities were carried out at Cihampelas 1 Middle School, Cihampelas Village, Cihampelas District, West Bandung Regency. Site selection was based on the school closest to the riverside area.

Table 1: Schedule of outreach activities

Provision of KKNM-PPM	Thursday, 23 June 2022
Implementation and Field Stages	
Preparation of KKNM Attributes (Online)	5 July 2022 to 6 July 2022
Preparation of KKNM Attributes	16 July 2022 to 19 July 2022
Implementation of KKNM	Wednesday, July 20, 2022
Post Field Stages	
Writing and tutoring	July - August

3.2. Methods

3.2.1. Integrative KKNM-PPM debriefing stage

Several stages of integrative KKNM-PPM debriefing include:

- a. Provision by DPL
- b. Determination of the Chair and Secretary of the group
- c. Group division

3.2.2. Implementation and Field Stages

There are several stages of implementation and field namely:

- a. Field survey
- b. Determination of work jobdesk
- c. Technical implementation of KKN
- d. Visit to the Village Head's office
- e. Sharing session of Clear Saguling students
- f. Counseling on flood disaster mitigation
- g. Group discussions to planning the D-day

3.2.3. Post Field Stage

The following is the post-field stage:

- a. Make KKN-PPM videos
- b. Conduct activity evaluation meetings
- c. Individual report creation
- d. Making group reports

3.2.4. Stages of Student Community Service Activities

The stages of KKN activities can be explained in Table 2.

Table 2: Student activities

Time	Activities	Executor	Target Audience	Place of execution	Target Achievement Results
Thursday, June 23, 2022	(Meeting) Provision of Community Service Program, Division of Group Structures	Field Supervisor and Student	Field Supervisor and Student	(online) Zoom Meetings	Explanation of the general description of the KKN activities to be carried out, creating the structure of the KKN group including the division of small groups, determining the details of the tasks.
Saturday, July 2, 2022	Field Survey	Student	Student, Principal of SMPN 1 Cihampelas, Head of the Bening Saguling Foundation, Head of Cihampelas Village	Bening Saguling Foundation (BSF)	Introduce yourself to ask for permission to hold KKN activities, see the activities carried out by BSF, identify problems that exist in Cihampelas village related to the KKN topic
Tuesday, July 5, 2022	(Meeting) Brainstorming, identifying problems, and formulating a list of activities	Student	Student	(online) Zoom Meetings	Determine activities to be carried out during KKN activities
Wednesday, July 6, 2022	(Meeting) Discussion of survey results, determination of work programs and technical implementation of KKN	Field Supervisor and Student	Field Supervisor and Student	(online) Zoom Meetings	Determination of work programs to be carried out during KKN activities, KKN activity budgets, and technical implementation of KKN activities
Thursday, July 14, 2022	Student mobilization to the location of the KKN implementation, visits to the Cihampelas Village Office and Cihampelas 1 Middle School	Student	Student, Principal of SMPN 1 Cihampelas, Head of the Bening Saguling Foundation, Head of Cihampelas Village	Cihampelas Village Office, SMPN 1 Cihampelas	Students arrive at the location of KKN activities, Welcome and Acceptance for Students to carry out KKN activities

Saturday, July 16, 2022	Preparation for KKN Activities at SMPN 1 Cihampelas	Students and the School	Students, School Parties, and New Students of SMPN 1 Cihampelas	Bening Saguling Foundation and SMPN 1 Cihampelas	1	Determination of prizes for winners, Determination of a series of activities, and negotiating regarding KKN activities at SMPN 1 Cihampelas
Sunday, July 17, 2022	Sharing Session with Students at the Bening Saguling Foundation	Field Students and Lecturers	Fostered/Educated Children at Bening Saguling Foundation	Bening Saguling Foundation		Sharing stories about the world of lectures and motivation for students at the Bening Saguling Foundation
Monday, July 18, 2022	(KKN Day-1) MPLS opening	Field Students and Lecturers	Students and Teachers from SMPN 1 Cihampelas	SMPN 1 Cihampelas	1	Activities regarding self-introduction to new students at SMPN 1 Cihampelas and delivery of technical implementation to new students
Tuesday, July 19, 2022	(KKN Day-2) Preparation of Material Extension Activities	Students and Parties SMPN 1 Cihampelas	Students and Parties SMPN 1 Cihampelas	SMPN 1 Cihampelas	1	Preparing classrooms for counseling activities and preparing prizes for activity winners
Wednesday, July 20, 2022	(KKN Day-3) Counseling on the topic of KKN and Digital Literacy	Student	New students of SMPN 1 Cihampelas	SMPN 1 Cihampelas	1	The activity contains the provision of material on disaster mitigation in watersheds and regarding digital literacy (according to Kominfo's directions), Games, Pre-Test and Post-Test
Thursday, July 21, 2022	(KKN Day 4) Closing of KKN activities at SMPN 1 Cihampelas	Students and the School	Students, School Parties, and New Students of SMPN 1 Cihampelas	SMPN 1 Cihampelas	1	Closing of MPLS activities and awarding prizes to students with the highest scores on both materials

Friday, July 22, 2022	(KKN Day-5)	Students and the Alam Bening Saguling Foundation School	Students of the Saguling Alam Bening School	Bening Saguling Foundation	In joint activities with the Bening Saguling Foundation, students help workers clean the river, and female students help teach at the Nature School
Tuesday, July 26, 2022	(Meeting) Coordination of additional activities and technical preparation of Reports	Field Supervisor and Student	Field Supervisor and Student	(Online) Zoom Meeting	Submission of additional activities from DPL and delivery of technical workmanship and collection of KKN reports
Wednesday, July 27, 2022	(Meeting) Coordination regarding the preparation of additional activities	Student	Student	(online) Zoom Meeting	Preparation of technical implementation and distribution of preparatory tasks for conducting digital literacy webinars
Saturday, July 30, 2022	Digital Literacy Webinar preparation work	Student	Student	(online) Whatsapp	Creation of requirements for Webinars
Sunday, July 31, 2022	Digital Literacy Webinar Preparation	Student	Student	(online) Zoom Meeting	Checking the webinar preparation of each team
Monday, August 1	(KKN Day-6) Digital Literacy Webinar	Field Supervisor and Student	General public	(online) Zoom Meeting	Digital literacy material counseling to the general public
Monday, July 25, 2022 Tuesday, August 2	Formulation of Reports, and Production of KKN Videos	Field Supervisor and Student	Student	(online)	Preparation of individual and sub-group KKN activity reports (Integrative KKN-PPM and Digital Literacy) and production of activity videos

4. Results and Discussion

Padjajaran University KKN-PPM activities were carried out by Student Teams with Field Supervisors, Prof. Dr. Sukono, MM, M.Si on July 4 2022 to August 4 2022 by holding community service activities divided into two projects, namely sub-group projects, and group projects. For sub-group projects, students provide education on natural disaster mitigation training to minimize the impact of the risk of economic loss in the Citarum Watershed (DAS), West Bandung Regency, which is located at Cihampelas 1 Middle School, West Bandung Regency. some of the achievements of these activities:

1. Presentation regarding the initial conditions of Cihampelas Village was delivered
2. Doing KKN preparation:
 - a. Establishing a disaster mitigation group
 - b. Perform disaster mitigation planning
 - c. Conducted a survey at SMPN 1 Cihampelas

- d. Make preparations related to logistics to support the needs of activities
3. Implementation of KKN:
 - a. Conducting lectures on disaster mitigation for SMPN 1 Cihampelas students went smoothly
 - b. students actively ask questions in discussion and material sessions
 - c. students actively discuss among themselves when carrying out tests
 - d. students present the results of their discussions in front of the class
 - e. give prizes to the best group
 - f. Closing of activities carried out at SMPN 1 Cihampelas
4. Help clean and sort garbage and water hyacinth in the Citarum River
5. Cleaning the area occupied during the activity
6. Write a report on KKN activities

5. Conclusion

Flood disaster events are common in the lowlands around the river flow. This harms the people who live around the area, so efforts are needed to overcome the impact caused by the disaster. KKN-PPM students conduct natural disaster mitigation training to minimize the impact of the risk of economic loss centrally in the Citarum River basin, West Bandung Regency. This training is aimed at the community, especially students at SMPN 1 Cihampelas, located near the Citarum watershed. The method used is materialization regarding environmental problems in the Citarum watershed, the causes, and effects of flooding and its prevention, and disaster mitigation carried out when a flood occurs. After conducting the materialization, students were asked to discuss and explain how to mitigate floods when they occur at the school. In its implementation, SMPN 1 Cihampelas students were directed to conduct Focus Group Discussions with the division of one group consisting of 20 people and each group being divided into sub-groups, each consisting of 10 people, to discuss evacuation maps and brief descriptions. Each group presented the work results, and the final score was recapitulated for each group. The target results or achievements in this activity have been achieved, namely by the results of the Focus Group Discussion assessment getting a good average score. From these results, it can be concluded that the training activities that were carried out went smoothly and well, and the students also responded positively to the holding of this Natural Disaster Mitigation Training Integrative KKN.

Recommendations that can be given for further KKN activities are that first, the target of the Citarum River KKN training is to be expanded. The two forms of Citarum River KKN training activities can be more varied so that the community's understanding of flood prevention can be further deepened. The three Citarum River KKN training practices can be carried out in more than one place. Fourth, on the implementation day, the coordination and conditioning of the activity participants will be further improved.

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