Abdimas Umtas: Jurnal Pengabdian Kepada Masyarakat
LPPM-Universitas Muhammadiyah Tasikmalaya
Volume: 8, Issue: 3, July, 2025; pp: 1513-1520
E-ISSN: 2614 - 8544

Empowering Coastal Youth: Taruna Siaga App Transforms Disaster Preparedness in Tsunami-Prone Pacitan Villages

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ABSTRACT

Background. Pacitan Regency is a coastal area in East Java rich in natural resources but located in a disaster-prone zone due to its position on the Pacific Ring of Fire. This geographical condition exposes Pacitan to high risks of earthquakes, tsunamis, floods, and landslides. The main problem faced by Karang Taruna (youth organization) partners in Pacitan is a low level of mitigation knowledge and minimal active participation in disaster preparedness planning. Data from the National Disaster Management Agency (BNPD) in 2023 supports this, showing that 71% of the community's knowledge on disaster risk reduction is at a "moderate" level, with only 2% being "excellent." **Objective**. This community service program aims to improve disaster preparedness through youth mentoring and training by utilizing an interactive application named "Taruna Siaga." **Method**. The program was implemented in four main stages: (1) Activity preparation and application development; (2) Training that included mitigation theory, application usage workshops, and evacuation simulations; (3) Monitoring and evaluation using pre-tests and post-tests; and (4) Follow-up through the formation of a local disaster preparedness team. **Results**. The program demonstrated a significant improvement in the disaster mitigation understanding and skills of 40 Karang Taruna members. This was evidenced by an increase in their average knowledge score from 65% to 87%. The "Taruna Siaga" application proved effective as an interactive and accessible educational medium. **Conclusion**. The implementation of this training program supports the formation of disaster-resilient communities in the coastal areas of Pacitan.

ARTICLE INFO

Article History :
Submitted/Received 17 May 2025
First Revised 2 July 2025
Accepted 29 July 2025
First Available online 31 July 2025
Publication Date 31 July 2025

Keyword :
Disaster Mitigation
Youth Organizations
Karang Taruna
Mobile Application
Community Resilience
Coastal Communities
Disaster Preparedness

https://doi.org/10.35568/abdimas.v8i3.6610

INTRODUCTION

Situation Analysis

Pacitan Regency is one of the coastal areas in East Java with abundant natural resources. Based on its geographical location, Pacitan Regency is situated in the coastal area and consists of hills, mountains, and ravines along the Ring of Firemountain range. This geographical condition causes Pacitan Regency to have many potential natural disasters such as floods, landslides, earthquakes, and tsunamis (Nuryanto et al., 2022).

The partner in this community service program is the Karang Taruna youth organization in Pacitan village, which is a social youth organization engaged in social welfare. This organization was formed as a platform to develop and empower youth in community life. The Karang Taruna of Pacitan village is led by Mr. Wahyu B Susilo with 40 active members located at Jalan Brigjen Katamso No. 80 RT 01 RW 03, Pacitan District, Pacitan Regency.

Activities that have been carried out by the Karang Taruna of Pacitan village include collaborating with the local government to support village development programs, such as health, education, and infrastructure programs. They also organize sports competitions, art performances, and cultural festivals to enhance creativity and togetherness among members and the community.

Partner Issues

The main problem faced is the lack of knowledge in disaster mitigation management and minimal active community participation in planning and decision-making related to disaster mitigation and sustainable development. Many community members, especially in rural and coastal areas, do not understand the early signs of earthquakes or tsunamis and do not know the steps to take to save themselves. The absence of education about earthquake and tsunami preparedness, including evacuation simulations, awareness campaigns, and education in schools and communities, is an important issue that needs to be addressed.

Based on the 2023 BNPD (Regional Disaster Management Agency) survey data in Pacitan city, community knowledge about risk reduction/mitigation in general is mostly at the "moderate" level. This is evidenced by community responses to questions about knowledge of disaster risk reduction, where 2% of the community answered very good, 22% answered good, 71% stated moderate, and 4% stated that knowledge about disaster mitigation is still poor.

Activity Objectives

1. Increase the knowledge and skills of Karang Taruna youth and the Pacitan village community about disaster preparedness and response through sustainable education programs.
2. Develop the "Taruna Siaga" interactive application to provide information about disaster mitigation and virtual simulations.
3. Conduct disaster simulation training and evacuation drills to strengthen preparedness in facing earthquakes and tsunamis.
4. Form a local disaster preparedness team capable of assisting the community when disasters occur.

PROBLEMS AND SOLUTIONS

https://doi.org/10.35568/abdimas.v8i3.6610

FIGURE 1. Logical Framework of the Disaster Preparedness Improvement Program in Pacitan

Limited disaster preparedness in coastal communities prone to earthquakes and tsunamis has become a pressing issue, as highlighted by the geographical location of Pacitan in the Ring of Fire region (Nuryanto et al., 2022). Several contributing factors exacerbate this problem, including lack of knowledge in disaster mitigation, minimal community participation, and poor understanding of warning signs. According to BNPD survey data from 2023, only 2% of community members had "very good" knowledge about disaster risk reduction, while 71% reported only "moderate" knowledge. To address this, a comprehensive intervention program was designed with the primary objective of improving disaster preparedness and resilience in coastal Pacitan villages.

The educational strategies involve providing interactive digital tools and hands-on training to build community capacity for disaster response (Elindasari et al., 2024). These efforts are supported by structured educational programs, including the Taruna Siaga interactive application, comprehensive training workshops, and practical evacuation simulations. The application features critical information about disasters, preparedness guides, virtual simulations, and evacuation route maps, making essential knowledge accessible to residents through their smartphones.

By targeting the Karang Taruna youth organization as primary participants, the program created sustainable local capacity for ongoing disaster management. The results demonstrated significant improvement, with knowledge scores increasing from 65% to 87% after the intervention. Most notably, understanding of tsunami response actions improved by 32%, and familiarity with evacuation routes increased by 28%. The formation of a 15-member Local Disaster Preparedness Team further strengthens community resilience by establishing trained coordinators who can assist during emergencies and maintain preparedness initiatives between formal training sessions.

METHOD

The community service program was implemented using a systematic method that includes four main stages: preparation, training implementation, monitoring and evaluation, and follow-up.

1. Participants and Sampling Method

The subjects of this community service program were 40 members of the Karang Taruna (youth organization) in Pacitan Village. Participants were selected using a purposive sampling technique. The criteria for inclusion were: (a) being an active member of Karang Taruna, (b) aged between 17-30 years, and (c) demonstrating a willingness and commitment to participate in the entire series of program activities.

2. Program Design and Procedure

The program began with an Activity Preparation stage, which included coordinating with the village government and Karang Taruna officials to socialize program objectives, forming an implementation team of facilitators and experts, and developing training materials. A key component of this stage was the development of the "Taruna Siaga," an interactive mobile application designed to

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serve as the main educational platform for disaster mitigation, evacuation simulations, and community-based early warning systems.

The Training Implementation stage focused on actively involving participants through:

a. Theory Workshops: Sessions on earthquake and tsunami mitigation theories, including understanding early warning signs, self-rescue techniques, and safe evacuation routes.

b. Application Training: Practical guidance for using the "Taruna Siaga" application as an educational and simulation tool.

c. Intensive Mentoring: Facilitators provided continuous guidance to ensure participants could understand and practice the knowledge and skills presented.

3. Data Collection and Evaluation

Program success was assessed through a Monitoring and Evaluation process.

a. Participant Knowledge Measurement: A quantitative approach was used, employing a pre-test and post-test to measure the increase in participants' understanding of disaster mitigation before and after the training.

b. Application Effectiveness Monitoring: The use of the "Taruna Siaga" application was monitored by analyzing user activity data, such as participation in online simulations and use of the emergency reporting feature.

c. Qualitative Feedback: Feedback was systematically collected from participants and village officials to identify and address deficiencies in both the training modules and the application.

4. Follow-up

The final stage was Follow-up, which focused on sustainability. This included the formation of a Local Disaster Preparedness Team composed of Karang Taruna members to assist the community during future events. Furthermore, a sustainable socialization plan was initiated, empowering the trained participants to act as agents of change by educating other community members on how to use the "Taruna Siaga" application.

RESULTS AND OUTPUTS

Activity Implementation

This community service program was conducted over six months in Pacitan Village. It began with coordination meetings, needs analysis, and focused on the development of the "Taruna Siaga" application. Theoretical and practical training, including evacuation simulations, was provided to 40 Karang Taruna members.

Activity Results

This community service program produced several important achievements:

Knowledge and Skills Improvement

The pre-test and post-test results showed a significant improvement in participants' understanding. The average knowledge score rose from 65% to 87%. The most significant improvements were in understanding actions during a tsunami (32% increase) and knowledge of evacuation routes (28% increase) Table 1. Evaluation Results of Participant Knowledge Improvement.

TABLE 1. Evaluation Results of Participant Knowledge Improvement.

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Knowledge Aspect	Pre-test (%)	Post-test (%)	Improvement (%)
Understanding of earthquakes	70	89	19
Understanding of tsunamis	68	90	22
Actions during earthquakes	65	85	20
Actions during tsunamis	58	90	32
Evacuation routes	62	90	28
First aid	60	80	20
Early warning systems	72	85	13
Average	65	87	22

Development and Adoption of "Taruna Siaga" Application

The "Taruna Siaga" application was successfully developed for the Android platform, considering ease of use for diverse users. Usability was evaluated through user feedback surveys during the workshops, where 92% of users rated the application as "easy to use" and 88% found the content "very informative". The application was adopted by 100% of participants and 45% of the general public in the village.

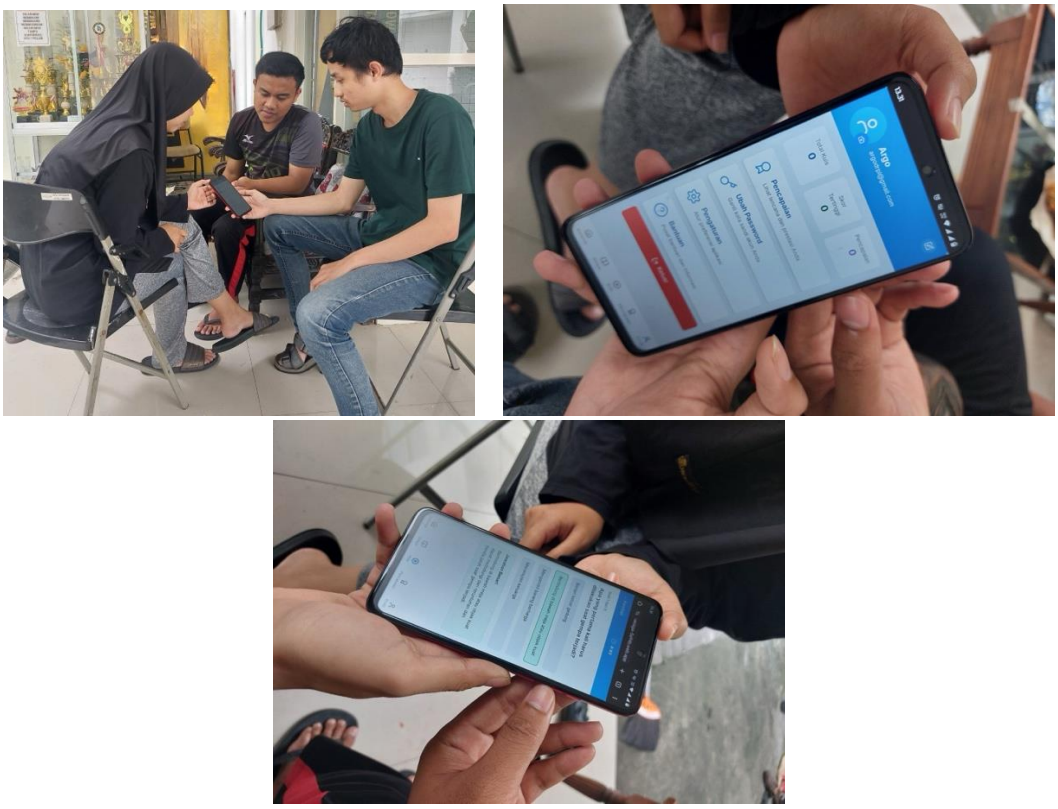

FIGURE 2. User Interface of the Taruna Siaga Application.

Formation of Disaster Preparedness Team and Evacuation Route Mapping

A 15-member Local Disaster Preparedness Team was formed from Karang Taruna members to act as village-level coordinators. This team received advanced training in disaster management and emergency communication. Additionally, a comprehensive evacuation route map was developed and integrated into the application, as well as installed at strategic points in the village.

Discussion (Second Level Heading)

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The mentoring and training program for Karang Taruna youth using the "Taruna Siaga" interactive application showed effectiveness in improving disaster preparedness in the coastal village of Pacitan. The significant improvement in knowledge after training indicates that the learning method combining theoretical and practical approaches successfully facilitated a better understanding of disaster mitigation.

The use of an interactive application as an educational medium proved to be an effective approach in conveying information about disaster preparedness. IDUWIN (2019) revealed that earthquake evacuation education as disaster mitigation is very important to improve community understanding of the early signs of earthquakes and their causes. The "Taruna Siaga" application successfully integrated these educational elements in an attractive and accessible format, allowing users to learn independently and repeatedly.

The evacuation simulations carried out in this program provided valuable practical experience for the participants. According to Danil (2021), the disaster mitigation cycle is divided into three stages: pre-disaster, during disaster, and post-disaster. The simulations focused on the pre-disaster and during-disaster stages, preparing participants to better face emergency situations. Evacuation drills helped participants understand safe routes and steps to take when disasters occur.

The formation of the Local Disaster Preparedness Team is a strategic step in ensuring program sustainability. This team is expected to become agents of change in the community and assist the village government in coordinating disaster mitigation efforts. In accordance with the Government Regulation of the Republic of Indonesia Number 21 of 2008 concerning the Implementation of Disaster Management, non-structural mitigation is a method or effort to reduce the risk of disaster impacts by empowering and providing good knowledge to the community.

Elindasari et al. (2024) state that technology-based interactive applications are one of the modern solutions in education and community preparedness for disasters. The "Taruna Siaga" application developed in this program has proven its effectiveness as an attractive and informative educational platform. The integration of virtual simulation features and evacuation route maps in the application provides significant added value for its users.

The main challenge in implementing this program is ensuring the continued use of the application and disaster mitigation practices after the program is completed. To overcome this, the ongoing socialization program and the formation of the Local Disaster Preparedness Team are expected to maintain the momentum that has been built and ensure that the knowledge and skills acquired continue to be practiced and disseminated in the community.

CONCLUSION

The mentoring and training program for Karang Taruna youth through the "Taruna Siaga" interactive application to improve preparedness in earthquake and tsunami-prone coastal villages in Pacitan District has successfully achieved its objectives. Several conclusions that can be drawn from this program are:

1. The "Taruna Siaga" interactive application has proven to be an effective educational medium in improving the understanding and skills of Karang Taruna members and the community regarding earthquake and tsunami disaster mitigation.
2. The training program that combines theoretical and practical approaches has successfully increased participants' knowledge about disaster preparedness significantly, with an average increase of 22%.
3. The formation of the Local Disaster Preparedness Team consisting of Karang Taruna members is a strategic step to ensure program sustainability and strengthen community capacity in facing disasters.

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4. Evacuation simulations and emergency response drills provided valuable practical experience for participants, preparing them to act appropriately when disasters occur.
5. Mapping evacuation routes and integrating them into the "Taruna Siaga" application contributes to increasing community preparedness by providing information about safe routes for evacuation.

This program shows that technology-based approaches, such as interactive applications, can be effective solutions in disaster mitigation education. Program sustainability is very important to ensure that the Pacitan village community remains alert and has the skills needed to face disasters, especially earthquakes and tsunamis.

SUGGESTION

To enhance the Taruna Siaga program's effectiveness and sustainability, several actions are recommended:

a. Program Sustainability and Community Engagement: To address the challenge of maintaining engagement, the Local Disaster Preparedness Team will execute a long-term action plan. This includes conducting biannual evacuation drills, managing a community WhatsApp group for real-time alerts, and performing regular checks on evacuation routes. The team will also socialize the app to new residents and organize annual refresher workshops to ensure community-wide preparedness.

b. Application Enhancement: Enhance the application with real-time seismic data, multilingual support, and gamification elements to increase user engagement.

c. Program Expansion: Broaden the program's scope to address other relevant disasters like floods and landslides and expand outreach to other vulnerable communities.

ACKNOWLEDGMENTS

The implementation team would like to thank the Research and Community Service Institute (LPPM) of Muhammadiyah University of Surabaya, which has supported and funded this community service program through the RISETMU 2025 scheme. Thank are also conveyed to the Pacitan Village Government, the Pacitan Village Karang Taruna officials, and the entire Pacitan Village community who have actively participated and supported the implementation of this program.

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