

PROMOTING A MODEL OF RESEARCH-BASED EDUCATION IN DISASTER MITIGATION

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Abstract

This paper highlights the importance to provide appropriate education model with multidisciplinary approach for supporting the capacity development in disaster mitigation. This education model is implemented as a student community service program, in order to accommodate the needs for improving the students' knowledge and skill, as well as for stimulating the development of ethical values with respect to humanity and sustainable development concerns. This education model has been conducting as a part of the formal curricula at Gadjah Mada University, and it is accordingly introduced and reviewed in this paper with the specific emphasize to discuss its objective, mechanism, benefits, and social impacts, as well as the respective challenges. Finally, this research-based education model is proposed as one model for the disaster mitigation education, which can be applied not only for Indonesian but may also for ASEAN education model.

Keywords: *Education model, research-based, disaster mitigation*

1 Background: the needs and challenges

ASEAN University Network/ SEED Net (AUN/SEED Net) has been establishing a special interdisciplinary field in Disaster Mitigation since the year of 2008. Obviously, the establishment of this interdisciplinary field is crucial for capacity development of young

researchers and the fresh graduates in all Member Institutions of ASEAN countries, in order to empower them to solve the problems related to the natural disaster in ASEAN region.

However, providing education program for disaster mitigation is not simple but quite challenging. It requires such rigorous considerations and holistic approach. Indeed, the natural disasters, especially those related to geological phenomena, need to be tackled by multidiscipline considerations, not only based on the geological knowledge but also require for addressing some other disciplines in Natural Sciences and Engineering, as well as in Socio-Economical Sciences. Moreover, it is also important that the learning process for disaster mitigation should also provide a media not only for the enhancement of knowledge but also for the development of practical skill and attitude with respect to ethical values relevant to disaster mitigation program.

Therefore, the learning process for the students' capacity building needs to be carefully designed to guarantee the effectiveness and appropriateness of student empowerment program for handling the real disaster problems in the field.

This keynote presentation will specially address the importance of developing an appropriate education model for disaster mitigation in ASEAN. Indeed, an existing education model that has been established at Gadjah Mada University in Indonesia would be proposed as one alternative of the model that might be adapted for ASEAN. The discussion on the mechanism of learning process conducted under this exist-

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ing education model, together with the respective benefits and limitations, will be addressed to review the appropriateness of such model for ASEAN countries.

2 Existing research-based education model for disaster mitigation at UGM

Indonesia has been frequently stroked by various disaster events due to the dynamic geological phenomena, which resulted in such substantial death tolls and socio-economical losses. These significant losses are apparently related to the low community resilient at the village level. Obviously, an urgent need for having a capacity development program to support the community resilient is considered as one important driving force to establish an appropriate education model for disaster mitigation.

Another important driving force is the mission of Gadjah Mada University (UGM) as the research university that should be dedicated for education and community service. Accordingly, this mission has been considered as another strong driving force to implement the research-based education activities for community service, especially for disaster mitigation at the vulnerable villages or cities.

3 Objective of establishment of student community service

In response to the problems and challenges above, a model of research-based education, which is so called as a **student community service program**, has been established at UGM learning curricula as a compulsory subject (with 3 credits), since more than 10 years ago. It is a compulsory program for all undergraduate students at the final year, as one requirement that should be undertaken by the students before graduation.

This program was initially conducted 30 years ago, with the aim to support the Indonesian development program at the village level by deploying students to the less-developed villages for the period of 2 months. Recently, this program can be adjusted to any particular development program at the village, including

the program for disaster mitigation. Accordingly, the aim of this research-based education program is to provide a media for **capacity development of the students** and/ or **young researchers** in disaster mitigation, by providing opportunities to enable them to support problem solving related to disaster mitigation at the village.

4 Mechanism

This education model, i.e. the student community service in disaster mitigation, is designed as the integration of learning process into community service program, and it is implemented as one special compulsory subject with 3 credits which should be based on an action research activity. Moreover, the model is also designed to facilitate the final year students of undergraduate (with 5 credits) and/ or for graduate (with 8 credits) levels to conduct the research with various topics related to disaster mitigation. These action researches may include several activities for:

- hazard, vulnerability and risk mapping as the one suggested by Saaty (1980), which is conducted as joint activities by students from Geological Engineering and from Faculty of Sociology and Psychology ;
- natural and social resources mapping as the joint activities conducted by the students from Faculty of Geography and Faculty of Social Science;
- slope stability analysis and prediction for landslide prevention which is undertaken as joint activities by the students from Civil Engineering and Geological Engineering;
- development of early warning system as the joint activities conducted by the students from Civil-Geology-Geodetical-Electrical Engineering;
- psychological assessment for community empowerment which is carried out as the joint activities by students from Faculty of Psychology and Faculty of Social Sciences;
- formulation of community-based disaster management as the joint activities by students from Faculty of Psychology and Faculty of Social Sciences.

Regarding the needs for multidisciplinary approach, this education program is directly coordinated and managed by the University Administration, and it is regularly conducted every year in June to August (for the period of two months) to support the solution process of any urgent issue (problem) occurring in the village/city, including the disaster mitigation issue. It is crucial that prior to this program, one main Faculty or Department has to propose to the University one topic of problem (in which the main program in one particular village is deliberately developed to tackle this particular problem) for one session of student community service program. For instance, the Geological Engineering Department can propose to the University one particular topic to tackle the problem of geological disaster mitigation at one particular vulnerable village, and so the Geological Engineering Department is assigned as the coordinator for the disaster mitigation education program in such village.

Accordingly, one team of 10 to 15 students from various disciplines should start to work together with the community living in one particular village to tackle the disaster mitigation problems based on their-own mono discipline approach and method. Obviously, there should be a mechanism for cross-communication among disciplines and joint effort within this team work of multidisciplinary students, to synergize the monodiscipline-based approach with several different but relevant disciplines, in order to perform one holistic mechanism for solving the disaster mitigation problems. To facilitate this learning process, at least one lecturer or researcher should be assigned as the field supervisor in conducting the community service in one particular village. In addition, several supervisors from various disciplines may also involve as the student advisers in the final year student's project and/ or master thesis work.

The duration of two months is mainly provided for data collection and preliminary practical analysis, together with the community empowerment activities. Then it may be extended for the maximum of one semester in the studio and laboratory to complete the analysis of

data, to developed synthesis and produce the research outputs for supporting disaster mitigation efforts at the village. The research outputs may include:

- Several materials or facilities for disaster mitigation such as the hazard map, vulnerability map and risk map
- Modules or materials for public education with respect to disaster mitigation
- Tools or equipment or systems for disaster (such as landslide) prevention and early warning system.
- Formulation of concept and program activities for community empowerment.
- Establishment of community task force for disaster mitigation and the supporting action plan.

5 Benefits and social impacts

This research-based education model is very useful to provide holistic approach in capacity development program for disaster mitigation. Indeed, several benefits can be obtained from this education model, not only for the students/ young researcher, but also for the local community. Capacity of students or young researchers in applying their discipline-based knowledge and skill for disaster mitigation can be effectively developed by cross-discipline communication and understanding. Students' creativity, team working and capacity for emotional management with strong concern in ethical values can also be significantly stimulated during their interaction with the local community. Furthermore, this education model is very strategic as a media for developing capacity of our future leaders/researchers/agent of change for having the strong spirit and ethical values in humanity and sustainable development. All of these benefits cannot be achieved only based on regular education model which is mainly conducted in the class.

It is also crucial that this mechanism of education model is also useful to support the improvement of community awareness and empowerment for disaster mitigation.

6 Challenges

Disaster mitigation efforts cannot be effectively undertaken by neglecting the multidiscipline approach. Admittedly, it is very challenging to initiate the communication and understanding among different disciplines. Fortunately, the young people or students seem to have more tolerant and “easy going” understanding, especially to appreciate to the different approach of different disciplines. Even though, the students can be a bridging media for the cross-discipline communication and appreciation.

Sometimes, the concept and theory obtained by the students in the class cannot be directly applied to solve the field problems. This may result in frustration or contra-productive actions, which is in the contrary with the objective of this education program. Therefore, the lecturer or student’s supervisor is challenged to be creative and adaptive in overcoming the gap between the theoretical concept and real field problems.

Case example: Student Community Service for Disaster Mitigation in West Sumatra, following the Earthquake of 30 September 2009.

a. Introduction

More than 50 spots of landslide occurred in West Sumatra Province as the results of the earthquake inducement with the magnitude of 7.6 Mb, on last September 30, 2009. The most destructive landslides occurred in Tandikek Nagari, Regency of Pariaman and also in Tanjungsani Nagari at Maninjau Lake region, Regency of Agam. Thus, both sites of destructive landslides were selected as the site for student community service program (Figure 1), which was undertaken from December 2, 2009 to January 9, 2010. It was identified based on geological investigation with respect to the landslide classification suggested by Cruden and Varnes (1996), that the landslide types occurred in Tandikek Nagari was the earth slides induced by the earthquake which then those developed as the earth flows induced by the rain (Figure 2). As a result, two villages and more than 100 peo-

ple were buried instantaneously. Whilst in Tanjungsani Nagari, the rock falls and rock slides occurred because of the initial inducement of the earthquake, and then those progressively developed as debris and rock flows (Figure 3) due to the rain-inducement which caused more than 200 families needed to be evacuated.

It was apparent that substantial volume of rock deposits hanging in the upper and middle slope of Maninjau Volcanic crater will be very potential to cause some other debris and rock flows under the next triggering earthquake and/ or rainfall. Thus, the need to find a safer area for community relocation is urgent.

b. Objectives and mechanism

In response to such need, two teams of students under the student community service program were deployed in Nagari Tanjungsani and Nagari Tandikek, in West Sumatra, for the period of 35 days. Each of the team consists of 10 students from various disciplines (Geological Engineering, Anthropology, Philosophy, Biology, Agriculture, and Socio-Economic disciplines) at UGM and Andalas University. The main task for this community service program is to support the disaster mitigation effort through:

- Landslide hazard mapping by adapting the method proposed in Saaty (1980) and also Lacasse and Nadim (2008), as well as in Karnawati et al (2008), for selecting the most appropriate sites for relocation.
- Public consultation and education for supporting the capacity development of the community for disaster mitigation, by adapting the method suggested in Karnawati et al (2009a and 2009b).

c. Outputs

From this student community service program, the effective practical solution for disaster management can be performed by producing the hazard map with the recommended sites for relocation (Figure 4) and by establishing the community task force for capacity development in disaster mitigation (Figure 5).

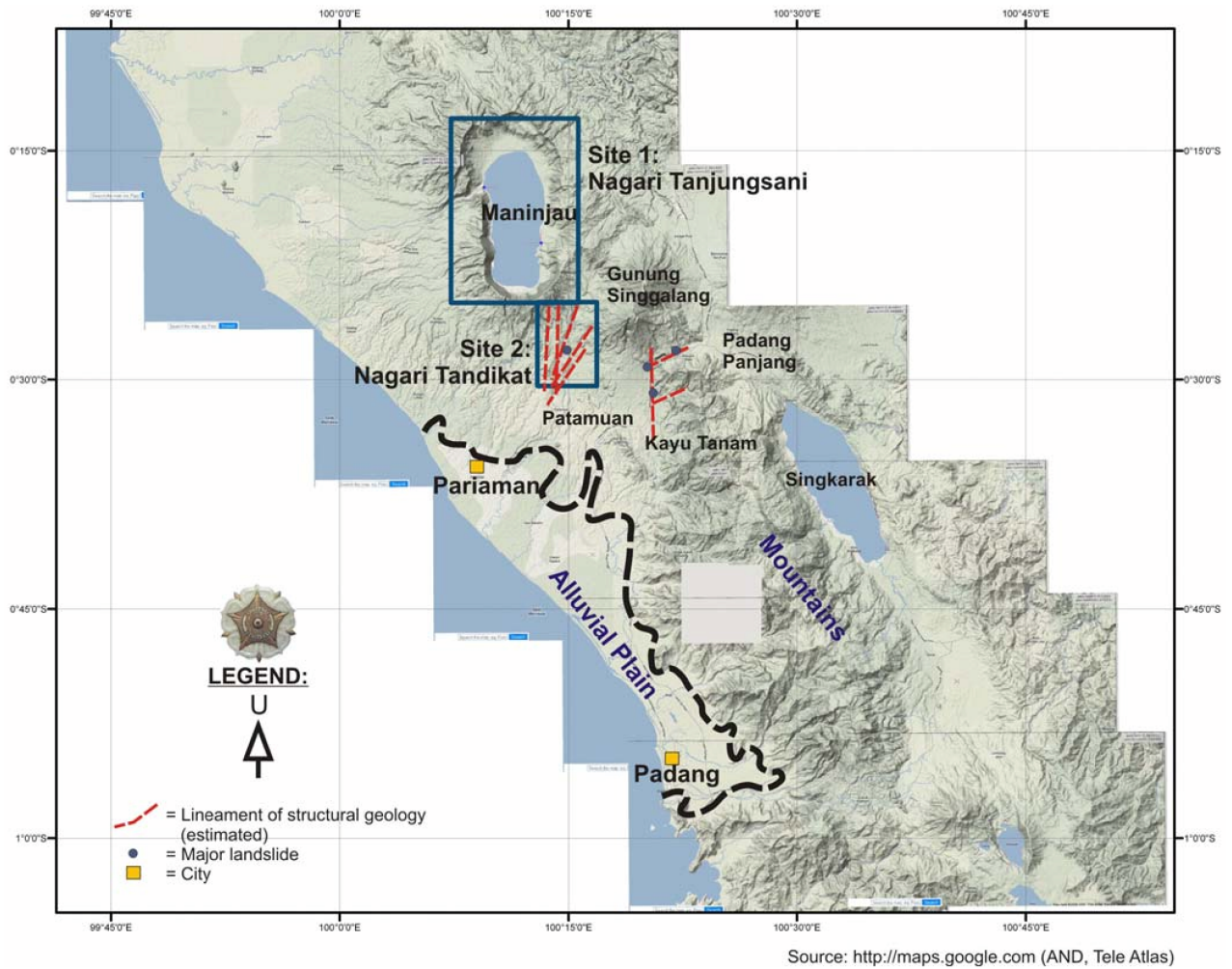


Figure 1: The location of student community service program for the earthquake and landslide mitigation in West Sumatra



Figure 2: Earthslides which have developed into earth flows in Tandikek Nagari, Pariaman Regency, West Sumatra, where more than 100 people buried



Figure 3: Debris flows in Tanjungsani Nagari, Agam Regency, West Sumatra which caused more than 200 families need to be relocated



Figure 5: Community task force for capacity development in disaster mitigation, the first task force established at the village level in West Sumatra

d. Social impacts

This student community program has been significantly contributed to solve the problem due to a conflict of risk perception between the national government and the local community, by providing public consultation and education to improve the community understanding about risks, as well as by recommending the alternative site for relocation. Before having this student community service program, the community was quite resistant to the government policy which considers transmigrating them to the safer area in different regency or different province. Fortunately, then two alternative of sites for relocation could be identified and recommended within the Lake Catchments area, and so the community does not need to be transmigrated to the different province. It is obvious that this recommendation provided from the student community service is considered as the most convenient and appropriate solution for the community which is also in line with the Government's policy for disaster risk reduction.

Reports of the whole activities of this student community service program also has been submitted to the National Agency for Disaster Management, which can be considered for the enhancement of national policy in disaster mitigation (Gadjah Mada University, 2010).

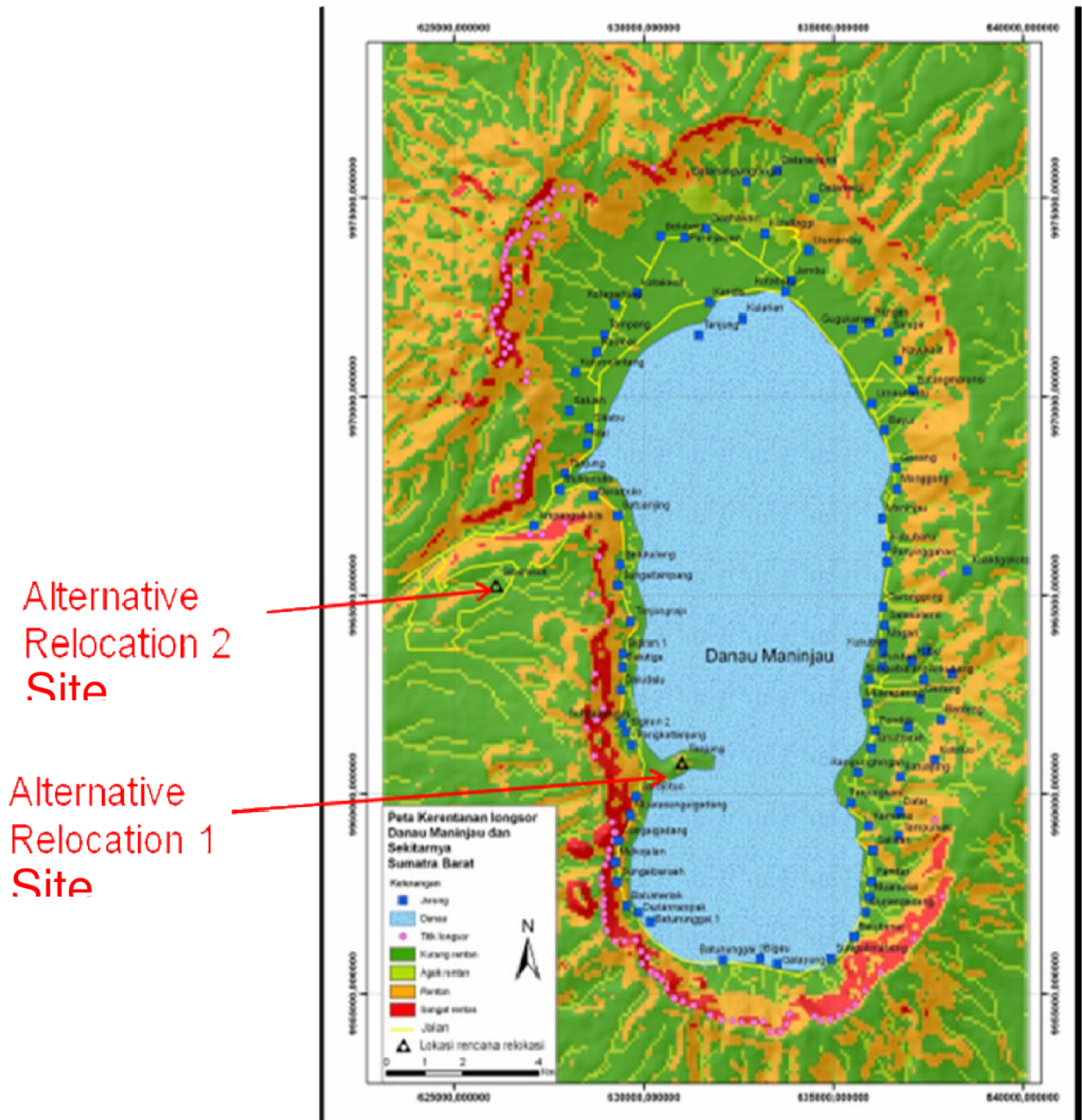


Figure 4: Landslide hazard map in Tanjungsani Nagari, with the identification of recommended sites for relocation (indicated by triangle symbol)

7 Conclusions

A research-based education model developed by Gadjah Mada University, which is so called as a student community service program, has been implemented successfully to support the disaster mitigation program at the village level in Indonesia. This model of education may also appropriate to be implemented as one model for disaster mitigation in ASEAN. This education model was deliberately designed by integrating a multi disciplinary learning program into community service program which is supported by the action research. Accordingly, such integration of learning and community service program is considered as one key effective method for providing holistic approach in the process of enhancing students' knowledge and skill with respect to community-based and research-based disaster mitigation. Furthermore, the development of ethical values with the strong concern on the humanity and sustainable development can also be stimulated through this learning model.

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