

## 1. Title

# **University-Community Collaborative Education Model for Developing Resilient Society in the Areas Vulnerable for Geological Disasters, in Indonesia.**

|                 |  |  |
|-----------------|--|--|
| ID:             | DRH 57   |  |
| Hazard:         | Earthquake , LandslideHazard<br>, MudflowHazard , Flash floodHazard<br>, Multi-hazardHazard                  |  |
| Category:       | Process Technology (PT)<br> |  |
| Proposer:       | Dwikorita Karnawati  |  |
| Country:        | INDONESIA;   |  |
| Date posted:    | 03 March 2010  |  |
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## Contact

Name : Dr. Dwikorita Karnawati

Position : Professor in Geological Engineering Department and also the Coordinator of the Main Facilitating Institution for the Interdisciplinary Research in Disaster Mitigation of ASEN University Network/ SEED Net.

Affiliation : Gadjah Mada University

Address : Geological Engineering Department, Jl. Grafika no 2. Yogyakarta 55281, INDONESIA.

Email : geologi@ugm.ac.id/ dwiko2007@yahoo.co.id

Tel & Fax : 62 274 513668 / 62 274 883 919 / 62 811 286 756

Co-writer 1 : Dr. Teuku Faisal Fathani

Position : Researcher and Lecturer in Department of Civil and Environmental Engineering

Affiliation : Gadjah Mada University, Indonesia

Co-writer 2 : Dr. Wahyu Wilopo

Researcher and Lecturer in Department of Geological Engineering Affiliation : Gadjah Mada University, Indoneisa

Co-writer 3: Ms. Budi Andayani,  
Position : Researcher and Lecturere in Faculty of Psychology  
Affiliation : Gadjah Mada University

Co-writer (4) : Prof. Kyoji Sassa  
Position : Prof. Emeritus of Kyoto University – Executive Director of ICL  
Affiliation : International Consortium on Landslides (ICL)

Co-writer (5) : Dr. Hiroshi Fukuoka  
Position : Assoc. Professor of Kyoto University  
Affiliation : Disaster Prevention Research Institute (DPRI) Kyoto University

## **2. Major significance / Summary**

The project addresses a university-community collaborative education model to support the geological disaster risk reduction (DRR) program at the local or village level. The specific objective is to provide a media for capacity development of students and young researchers to enable them to dedicate their knowledge and skill to support the development of society resilient in a particular village, which is vulnerable for any geological disaster.

## **3. Keywords**

Research-based education, capacity development for students and young researcher, local community, society resilient

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# **II. Categories**

## **4. Focus of this information**

Process Technology (PT)

## **5. Users**

**5-1. Anticipated users:** Community leaders (voluntary base) , Municipalities , National governments ad other intermediate government bodies (state, prefecture, district, etc.) , NGO/NPO project managers and staff , International organizations (UN organizations and programmes, WB, ADRC, EC, etc.) , Financing ad insurance business personnel , Teachers and educators , Architects and engineers , Sociologists and political economists , Information technology specialists , Rural planners , Environmental/Ecological specialists , Others

**5-2. Other users:** Policy makers , Motivated researchers , Local residents

## **6. Hazards focused**

Earthquake , Landslide , Mudflow , Flash flood , Multi-hazard

## **7. Elements at risk**

Human lives , Human networks in local communities , Business and livelihoods , Infrastructure , Information and communication system , Rural areas , River banks and fluvial basin , Mountain slopes , Agricultural lands

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### **III. Contact Information**

#### **8. Proposer(s) information (Writer of this template)**

Name : Dr. Dwikorita Karnawati

Position : Professor in Geological Engineering Department and also the Coordinator of the Main Facilitating Institution for the Interdisciplinary Research in Disaster Mitigation of ASEN University Network/ SEED Net.

Affiliation : Gadjah Mada University

Address : Geological Engineering Department, Jl. Grafika no 2. Yogyakarta 55281, INDONESIA.

Email : geologi@ugm.ac.id/ dwiko2007@yahoo.co.id

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Affiliation : Disaster Prevention Research Institute (DPRI) Kyoto University

#### **9. Country(ies)/region(s) where the technology/knowledge/practice originated**

INDONESIA;

Central Java & West Sumatra

#### **10. Names and institutions of technology/knowledge developers**

Prof. Dr. Dwikorita Karnawati

Gadjah Mada University

INDONESIA

## **11. Title of relevant projects if any**

- a. Earthquake microzonation mapping at Bantul Regency of Yogyakarta Province, supported by JICA AUN/SEED Net ( 2006-2007).
- b. Development of community-based landslide early warning system supported by Indonesian Ministry for Development of Disadvantages Region (2007), as well as by the Indonesian Agency for Disaster Management (2008), Gadjah Mada University (2008-2009) and the International Consortium on Landslide (2007-now).
- c. Seismic and Landslide Hazard Mapping for Community Empowerment, supported by British Council under Development Partnership in Higher Education ( DelPHE) Project (2007-2010)
- d. Development of Landslide Early Warning System with respect to Community Empowerment and Appropriate Technology, Research Excellent for National Strategy, supported by Indonesian Ministry of Education (2009)
- e. Development of Landslide Early Warning based on GPS “on-line” system, supported by Gadjah Mada University under Research Cluster Project (2009).
- f. Student Community Service for Disaster Mitigation Program in Central Java supported by Gadjah Mada University and the Indonesian Ministry of National Education (2009) and in West Sumatra (2009-2010) supported by the Indonesian Ministry of National Education and the Oil and Gas Industries.

## **12. References and publications**

1. Karnawati, D. , T.F. Fathani, Budi Andayani, P.W. Burton and I. Sudarno, “Strategic program for landslide disaster risk reduction; a lesson learned from Central Java, Indonesia” , in Disaster Management and Human Health Risk; Reducing Risk, Improving Outcomes. Eds : K. Duncan and C.A. Brebbia. WIT Transactions on the Built Environment, WIT Press, Southampton, UK. p.115-126.
2. Karnawati, D., T.F. Fathani, Budi Andayan and P.W. Burto “Landslide Hazard and Community-based Risk Reduction Efforts in Karanganyar and the Surrounding Area, Central Java, Indonesia”, published in the Proceeding of the 7th Regional Conference of IAEG (Int. Assoc. Of Engineering Geology), 9-11 September 2009, Chengdu, China. p.436-441.
3. Karnawati, D., S. Pramumijoyo, S. Hussein, B. Andayani, P.W. Burton. 2009. A New Approach of Earthquake Hazard Mapping as A Tool to Facilitate Public and Non Technical Decision Maker; A Pilot Study in Bantul, Yogyakarta Province, Indonesia. Proceeding of Geohazard and Geo-Disaster Mitigation RC-GeoEnvi 2009. March 2 – 4, 2009, Kuala Lumpur, Malaysia. p. 32-38.
4. Karnawati, D. and S. Pramumijoyo. 2008. Strategy for Promoting Education for Natural Disaster Reduction in Indonesia and ASEAN Region. Proceeding of the First World Landslide Forum, 18-21 Nov. 2008. United Nation University, Tokyo, Japan. Global Promotion Committee of The Int. Program on Landslide (IPL) – ISDR. p. 301 – 305.
5. Karnawati, D., T.F. Fathani, Ign. Sudarno, B. Andayani. 2008. Development of Community-based Landslide Early Warning System in Indonesia. Proceeding of the First World Landslide Forum, 18-21 Nov. 2008. United Nation University, Tokyo, Japan. Global Promotion Committee of The International Program on Landslide (IPL) – ISDR. p. 305 – 308.
6. Fathani, T.F., D. Karnawati, K. Sassa, H. Fukuoka. 2008. Development of Landslide Monitoring and Early Warning System in Indonesia. Proceeding of the First World Landslide Forum, 18-21 Nov. 2008.

United Nation University, Tokyo, Japan. Global Promotion Committee of The Int. Program on Landslide (IPL) – ISDR. p. 195 - 198.

7. Andayani, B. D. Karnawati, S. Pramumijoyo. 2008. Institutional Frame Work for Community Empowerment towards Landslide Mitigation and Risk Reduction in Indonesia. Proceeding of the First World Landslide Forum, 18-21 Nov. 2008. United Nation University, Tokyo, Japan. Global Promotion Committee of The Int. Program on Landslide (IPL) – ISDR. P. 57-59.

8. Karnawati, D., Pramumijoyo, S. Andayani, P.W. Burton. 2008. Earthquake & Landslide Hazard Mapping For Community Empowerment. Proceeding of the 51st Annual Meeting Assoc. of Engineering and Environmental Geologist. Sept. 15 – 20, 2008. New Orleans, Louisiana, USA.

9. Karnawati, D. and T. F. Fathani. 2008. Mechanism of Earthquake Induced Landslides in Yogyakarta Province, Indonesia. Published in The Yogyakarta Earthquake of May 27, 2006. Eds. D. Karnawati, S. Pramumijoyo, R. Anderson and S. Hussein. STAR Publishing Company Inc., Belmont, CA. ISBN 978 – 0

10. Karnawati, D. 2008. Earthquake Induced Landslide at Sengir , Prambanan District, Yogyakarta Province, Indonesia. Published in The Yogyakarta Earthquake of May 27, 2006. Eds. D. Karnawati, S. Pramumijoyo, R. Anderson and S. Hussein. STAR Publishing Company Inc., Belmont, CA. ISBN 978 – 0 – 89863 – 304

11. Karnawati, D. S. Hussein, S. Pramumijoyo, A. Ratdomopurbo, K. Watanabe and R.. Anderson. 2008. Earthquake Microzonation and Hazard Maps of the Bantul Area, Yogyakarta, Indonesia. Published in The Yogyakarta Earthquake of May 27, 2006. Eds. D. Karnawati, S. Pramumijoyo, R. Anderson and S. Hussein. STAR Publishing Company Inc., Belmont, CA. ISBN 978 – 0 – 89863 – 304 – 7. p 7-1 to 7–15.

12. Karnawati, D, S. Pramumijoyo and H. Hendrayana, 2006. Geology of Yogyakarta, Java; the Dynamic Volcanic Arc City. Proc. of 10th International Assoc. of Engineering Geology (IAEG) International Congress, Nottingham United Kingdom, September 6-11, 2006

13. Karnawati, D, S. Pramumijoyo and K. Uchino, 2006. Strategy and Programs for Geological Education in Geohazard Vulnerable Areas in the South East Asia. Proc. of 10th International Assoc. of Engineering Geology (IAEG) International Congress, Nottingham United Kingdom, September 6-11, 2006

### **13. Note on ownership if any**

Gadjah Mada University, Indonesia

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## **IV. Background**

### **14. Disaster events and/or societal circumstances, which became the driving force either for developing the technology/knowledge or enhancing its practice**

Several disaster events and the factual finding that community resilient at the village level in Indonesia is still quite low are considered as the driving force for this development of Process Technology for capacity development. In fact, series of disaster events, such as Yogyakarta Earthquake in May 27, 2006; Bengkulu Earthquake in September 2007; Cianjur Earthquake in September 2009 and West Sumatran Earthquake in September 30, 2009, as well as various debris floods and landslide disasters which more frequently occur since the year of 2000, have been seriously resulted in thousands of death tolls and very bad socio-economical loss, due to low community resilient at the village level.

Another important driving force is the mission of Gadjah Mada University as the research university that should be dedicated for education and community service. In fact, this University has been developed the research-education model for sustainable development since more than five years a go, and this mission is

strongly relevant to be implemented for the disaster risk reduction.

Various disasters as the driving force of this proposed capacity development activities are illustrated below:



**Fig.1.** Yogyakarta Earthquake on May 27, 2006 (left) and rain-induced landslide in Karanganyar, Central Java on February, 2009.



**Fig.2.** Debris slides (left) and rock falls (right) induced by the earthquake in West Sumatra occurred on September 30, 2009.

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## V. Description

### 15. Feature and attribute

#### **Aim :**

- To enhance the education process by exposing and providing more opportunity for the students to learn and implement their knowledge and skill gained in the class for solving the real disaster problem in the field and society.
- To support the disaster risk reduction program in Indonesia, through the capacity development of students/ young researchers, as well as through the community empowerment

**Mechanism ;**

This capacity development program is implemented as a summer school to facilitate the compulsory subject in undergraduate curricula at UGM, and this program is so called as a Student Community Service-Community Empowerment Learning (SCS-CEL) program (with 3 credits). Such program consists of pre-departure course ( for one week) followed by the field works at the village and workshop for data compilation and analysis either at the village or in the Campus. This Program is implemented by deploying a team of students (consist of 20 - 30 students) from various disciplines in Engineering, Natural and Social Sciences, Agriculture, Health and may also from Economic and Business, in order to support the geological disaster risk reduction program at the village. Thus, the students should be capable to work together as a multidisciplinary team, and to integrate their knowledge and skill for disaster risk reduction. Joint participation of students, community and the local government should be developed through this program, to guarantee the efectivity and sustainability of geological disaster risk reduction program.

This summer school can be a supporting research for undergraduate students to conduct their final year project (with an additional 5 credit units), and for master student to carry out the thesis work (with 8 credit units). Those research projects may include hazard, vulnerability and risk mapping; natural and soical resources mapping; slope stability analysis and prediction for landslide prevention, psychological assessment for community empowerment, formulation of community-based disaster management, etc.

Indeed, this education model provides various benefits 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 reducing the risk of geological disaster can be effectively developed by cross-discipline approach. Emosional mangement and various ethical values can also be significantly stimulated during their interaction with the local community.

Obviously, this mechanism of education model is important to support the improvement of community awarness and empowerment to reduce the risk of geological disaster, and it has been implemented in Bantul Region of Yogyakarta Province, financially supported by JICA/ AUN SEED Net (in 2006-2007) and by the British Council (2007-2010), in Karanganyar Regency of Central Java supported by International Landslide Consortium, the British Council, Gadjah Mada University, and Indonesian National Agency for Disaster Management (2008-2009), and also in West Sumatra in December 2009 up to 2010 for the community-based earthquake-induced landslide mitigation, in which the multi-national oil companies in Indonesia and the Indonesian Ministry of National Education provides the financial supports whilst the International Consortium on Landslide provide the technical and scientific supports.

More detailed information related to course is enclosed in the paper accepted as the keynote speech in the International Symposium on Disaster Management that will be held on February 25-26, 2010 in Bal

**Expected Users:**

Expected users of this method may be those shown in **Figs. 3, 4, and 5.**



**Fig. 3.** Member of Parlement as the user of this technology and knowledge for developing national strategy and policy in disaster risk reduction (DRR)



ca, Europe & USA are interested to have joint learning



**Fig. 5.** Local residents and local government are the most immediate users of the outputs of this joint capacity development

## **16. Necessary process to implement**



Procedures:

Major actors :

- a. Students of Undergraduate at Gadjah Mada University from various disciplines of Engineering, Natural, Social, Business, Law and Medical Sciences, should be the main actors through the implementation of University Curricula with the compulsory course on student community service program (3 credits), and or through the final year project (5 credits).
- b. Students of Master Course at Gadjah Mada University from various disciplines, can be the main actors (not compulsory) to be involved by integrating this research-based education model for his/her master thesis work (8 credits)
- c. The young and/ or senior lecturers/ researchers as the students' supervisors.
- d. The Management Staff of University Research and Community Service Program.
- e. The Senior Vice Rector for Education, Research and Community Service of Gadjah Mada University as the Responsible person in Charge.
- f. The local Government Leader and Officers as the stake holders.
- g. The local key persons and local communities as the participants for community empowerment.
- h. The local NGO may also participate as the partners.
- i. Private or Governmental Companies may also participate to provide financial sponsors as a part of their Corporate Social Responsibilities.

## **17. Strength and limitations**

**Strength :**

This research-based education model is considered as an excellent media to provide holistic approach in capacity development program for disaster risk reduction actions. Not only academic or scientific and education approach are implemented, but this model also addresses the humanity and sustainable development concerns.

**Limitations :**

Effective communication process with the community and multi-stakeholders is the key driving force to assure the success of this capacity development program. To initiate, develop and maintain such effective communication quite a lot efforts and time are required. Indeed, this is the most tough challenge for the adviser and the students to work out.

## **18. Lessons learned through implementation if any**

It is learned that this researched based education model is also very valuable not only to develop the knowledge and skill of students in handling the disaster risk reduction program, but also considered as a useful media to stimulate the development of ethical values with respect to the humanity and moral issues. During the implementation of this education model, community empowerment at village level for disaster risk reduction can also be stimulated and developed.

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## **VI. Resources required**

### **19. Facilities and equipments required**

Facilities required for :

- a. hazard, vulnerability and risk mapping.
- b. Socio-economical mapping
- c. Community empowerment program through training, focus group discussion, and other community participation program such as public education and evacuation drill.
- d. Development of local and/ or indigeneous technology and infrastructures for disaster risk reduction actions, such as the indigeneou technology for early warning system, local communication system and network, revegetation and green technology for environmental protection, etc.

## **20. Costs, organization, manpower, etc.**

Cost of this program is mainly supported by Gadjah Mada University, but some additional budget which may become the major supports can also be generated from the private companies/government institutions/ and local government resources.

The manpower mainly supported by the students and lecturers or young researchers who are deployed in the field together with the local communities, in coordination with the local governments.

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## **VII. Message from the proposer if any**

### **21. Message**

This capacity development program provides a lot of opportunity for conducting public communication and education actions. Thus this proposed program can be implemented as an effective mechanism to solve conflict of perception about the risk of disasters, which usually to become one serious obstacle for disaster mitigation program.

The main challenges in conductin this program is to understand the community aspiration and then to motivate them to be actively in participating in the disaster risk reduction actions at the village. That is why social survey and mapping need to be carried out at the begining of the such program. Then, the establishment of a community task force at the village should be the most important target, in order to assure the sustainability and efectivity of the implementation of this capacity development program.

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## **VIII. Self evaluation in relation to applicability**

### **22. How do you evaluate the technology/knowledge that you have proposed?**

It is a technology/knowledge that has fair applicability demonstrated by implementation in one or more field sites.

### **23. Notes on the applicability if any**

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## **IX. Application examples**

## **No.1**

### **E1-1. Project name if available**

Research-based education for rain-induced landslide disaster risk reduction in Tawangmangu District, Karanganyar Regency, Central Java, Indonesia

### **E1-2. Place**

in Tawangmangu District, Karanganyar Regency, Central Java, Indonesia

### **E1-3. Year**

2009

### **E1-4. Investor**

Gadjah Mada University-Ministry of National Education, Local Government of Karanganyar Regency for the financial and facility supports, as well as the International Consortium on Landslide and the British Council Delphe Project for the scientific and facility supports

### **E1-5. People involved**

Students, Researchers and Lecturers with multidisciplinary background from Gadjah Mada University and from Andalas University

Local community and the key person at the project area.

Local government of Karanganyar Regency

Indonesian National Agency for Disaster Management.

### **E1-6. Monetary costs incurred**

USD 8000 (provided by Gadjah Mada University – Ministry of National Education & The British Council DELPHE Project)

One set of landslide early warning system – provided by The International Consortium on Landslide

### **E1-7. Total workload required**

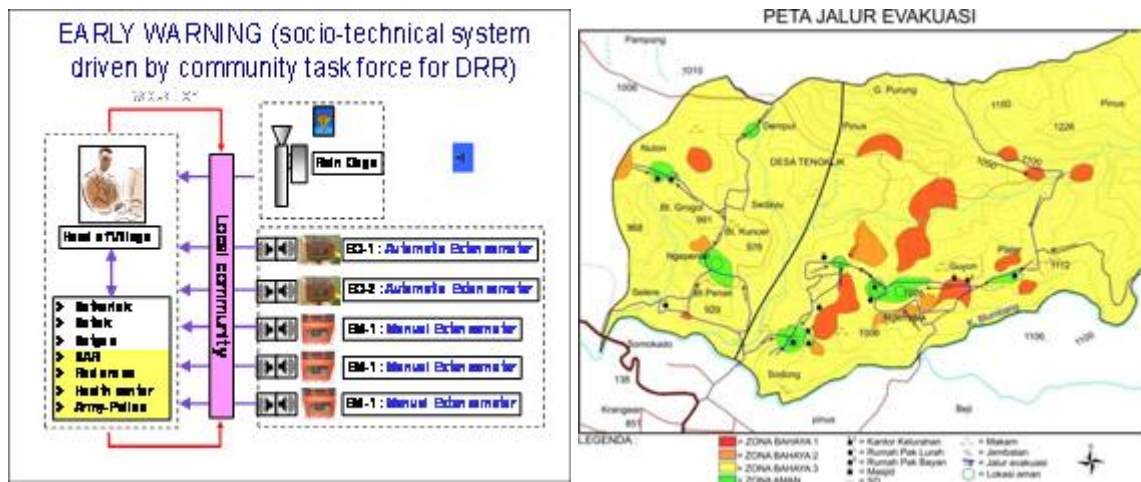
Deployment of students in the field was undertaken for 2 months.

Analysis results was conducted for another 2 months.

## E1-8. Evidence of positive result

### Tangible evidence :

- The availability of landslide early warning system equipment as reported by Fathani.
- The establishment of Community Task Force for Disaster Risk Reduction and early warnig system (Fig. 6 left)
- Landslide hazard and risk map, supported by the map of evacuation route and shelter (Fig. 6 right)
- Standard Operational Procedure for Evacuation.
- Materials of public education for improving community awarness (Fig. 7)



**Fig. 6.**Schematic framework of the community task force for DRR and landslide early warning system (left) and community hazard map (right)



**Fig.7.** Materials for public education : lanslide calender and early warning (most left), community hazard and risk map and the evacuation route (center), and procedure for evacuation (bottom right).

**Intangible evidence :**

- a. Improvement of community awareness and capacity for disaster risk reduction.
- b. Improvement of students'/young researchers' knowledge and skill for landslide disaster management.
- c. Positive attitude of students with respect to ethical values for humanitarian and sustainable development spirits.
- d. Better communication and coordination for disaster early warning and risk reduction with the regency and provincial disaster management institutions.

**No.2****E2-1. Project name if available**

Research-based education for earthquake induced landslide risk reduction

**E2-2. Place**

Tanjungsani Village at Agam Regency and Tandikek Village at Pariaman Regency, West Sumatra Province, Indonesia

**E2-3. Year**

2009 to 2010

**E2-4. Investor**

Gadjah Mada University – Ministry of National Education  
Multi-national Oil Companies in Indonesia

**E2-5. People involved**

Students, Researchers and Lecturers with multidisciplinary background from Gadjah Mada University and from Andalas University

Local community and the key person at the project area.

Local government of Agam and Pariaman Regency, as well as of the West Sumatra Province.

Geological Survey of Indonesia.

Indonesian National Agency for Disaster Management.

**E2-6. Monetary costs incurred**

### **First Batch in December 2009 to January 2010 :**

30,000 USD supported by Oil Companies

10,000 USD supported by Gadjah Mada University-Ministry of National Education

### **E2-7. Total workload required**

First Batch (Dec 2009 – January 2010) : 21 students and 10 researchers/ lecturers, plus two volunteers.

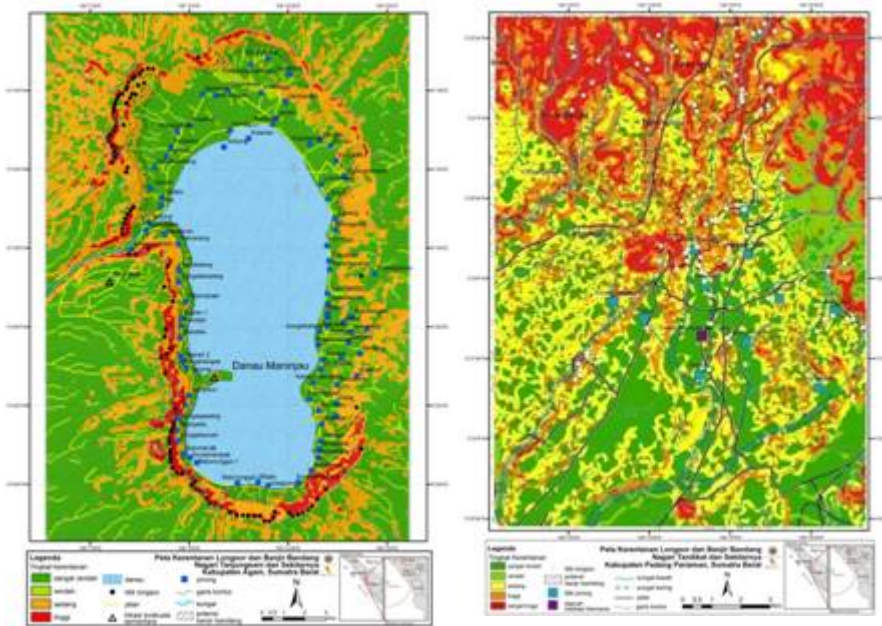
### **E2-8. Evidence of positive result**

#### **Tangible evidence :**

- a. The establishment of Community Task Force for Disaster Risk Reduction (Fig. 8).
- b. Landslide hazard and risk map, supported by the map of evacuation route and shelter (Fig. 9).
- c. Modules/ materials for public education with respect to landslide disaster risk reduction.
- d. Standard Operational Procedure for Evacuation.
- e. Materials (modules, posters, booklet and calender) for public education with respect to landslide disaster risk reduction.



**Fig. 8.** Community task force of Tanjungsani Nagari at Agam Regency (left) and Tandikek Nagari at Pariaman Regency (right) in West Sumatra Province



**Fig. 9.** Landslide hazard map of Maninjau Lake, Tanjungsani Nagari (left) and of Tandikek Nagari (right) at West Sumatra.

**Intangible evidence :**

- a. Improvement of community awarness and capacity for disaster risk reduction.
- b. Improvement of students’/young researchers’ knowledge and skill for landslide disaster management.
- c. Positive attitude of students with respect to ethical values for humanitarian and sustainable development spirits.

**Additional outcomes to be proposed for the second batch :**

- The availability of landslide early warning system equipment.
- Improvement of practical skill of the Community Task Force as the main driving force for Disaster Risk Reduction at the village level.
- Better communication and coordination for disaster early warning and risk reduction with the regency and provincial disaster management institutions

**X. Other related parallel initiatives if any**

**Message**

This education model has been promoted and recognized as one research excellence of International Program on Landslide under UNESCO (no IPL 159)

**XI. Remarks for version upgrade**

**Message**

**Attached files:**

> DRH57\_Cover\_photo.png (PNG - 99 Kb)