

Case study n°6

ISO 22327 Community-based Landslide Early Warning System as a Tool towards Sustainable Community Development on Disaster Risk Reduction

Country: Indonesia

Level: National, Subnational, Local



SDG Addressed: SDG 11 – Sustainable Cities and Communities

Summary

The objective of the case study is to show the impact of the initial trial – by 98 districts throughout 28 provinces of Indonesia – of the new International Standard ISO 22327 on “Security and resilience - Emergency management - Guidelines for implementation of a community-based landslide early warning system” to strengthen community resilience to landslide disasters.

The standard – which has just been approved and is in the process of being published – has already proved to be able to save lives when the disaster occurs. This directly contributes to the achievement of SDG Goal 11.b, to “develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels”.

The standard was implemented in collaboration with the Indonesian National Authority for Disaster Management (BNPB), Ministry of Village, Development of Disadvantaged Regions and Transmigration of Indonesia (KEMENDES), and Regional Disaster Management Agency (BPBD), as regional response team, to ensure the objective of this standard was successfully captured by the community.

Early warning systems were installed at the districts with the highest possibility of landslide occurrence. Technical assessment was carried out for determining the hazard risk area. Other than technical issues, it was ensured that the community understood how to respond in the event of a warning from the system. Socialization was conducted to disseminate

the knowledge of landslide to the community and local communities and authorities were encouraged the local community, accompanied with the local authority, to make Standard Operation Procedure (SOP) for evacuation and developed evacuation map that was familiar to the local knowledge. In the application of this standard, it was found to significantly reduce casualties caused by landslide. However, to ensure that this system will work sustainably, greater cooperation and commitment between the government and the community is needed.

Background

Landslides are one of the most widespread and frequent natural and anthropogenic hazards in the world. The implementation of mitigation measure usually focused in avoiding slope failure or diverting the moving mass away from vulnerable elements or build reinforcement to protect the threatened elements. However, it is quite often that this particular zone has been developed as dense settlement of housing and infrastructure areas, and the relocation of people living in this area to the safer zone cannot be conducted due to some socio-economical constraints. Thus, development of landslide warning system becomes very critical to protect the people living in the landslide risk area.

The majority of the early warning system included the implementation of various technological and modeling methods to predict landslide. For example, a system installed in the Citarum River Catchment in Indonesia uses hydrological-geological modeling to

predict the landslide. However, cultural, economic, social, and demographic considerations are often left out of the design compared to the other technical aspects in the currently developed early warning systems.

By implementing a simple, low-cost early warning system and improving the dissemination of information at local and national levels. The need for a legal standard is important to exemplify the early warning capacity and increase the community compliance. Considering that landslide disasters commonly occur at a local area having similar geomorphology and geological condition, the proposed standard only addresses local scale landslide. This standard is aimed at empowering individuals and community at risk to act in sufficient time to reduce the number of the casualties. This standard is also expected to increase the awareness and encouraged the governmental disaster management agency, such as the Indonesian National Authority for Disaster Management (BNPB) and Regional Disaster Management Agency (BPBD), and related stakeholders to conduct regular socialization and monitoring to ensure the sustainability of the whole system of early warning.

Strategy

The approach needs inter-disciplinary roles to support disaster risk reduction in the context of community development. The technical approach plays a role in the risk assessment and installation of hazard monitoring and warning services. However, based on experience in installation of landslide early warning instruments in Southeast Asian countries since

2007, focusing only on the technical approach does not guarantee the effectiveness and sustainability of the systems. In order to overcome this problem, applying a social lens plays a key role in the success of the program, particularly in terms of establishing the disaster preparedness protocol, developing the response team, evacuation map, a standard operating procedure, and enhancing local commitment.

Taking into account the four key elements of a people-centered early warning system (UN-ISDR, 2006) and the hybrid socio-technical approach for disaster risk reduction, a universal standard for landslide early warning systems which comprises seven sub-systems, namely: risk assessment, dissemination and communication of knowledge, establishment of a disaster preparedness team, development of an evacuation route and map, development of standard operating procedures, monitoring, early warning and evacuation drill, and commitment of the local government and community on the operation and maintenance of the whole system.

Universitas Gadjah Mada (UGM) in cooperation with the government bodies and private sectors has implemented the newly proposed standard in 98 districts throughout 28 provinces in Indonesia and in Myanmar (as shown in Figure 1).

Regular monitoring and socialization was conducted together with the Regional Disaster Management Agency (BPBD) to deliver disaster knowledge to the community. The community was familiarized with the local geomorphology and topography of the region and neighboring village to be able to make their own evacuation plan. Then, the community accompanied

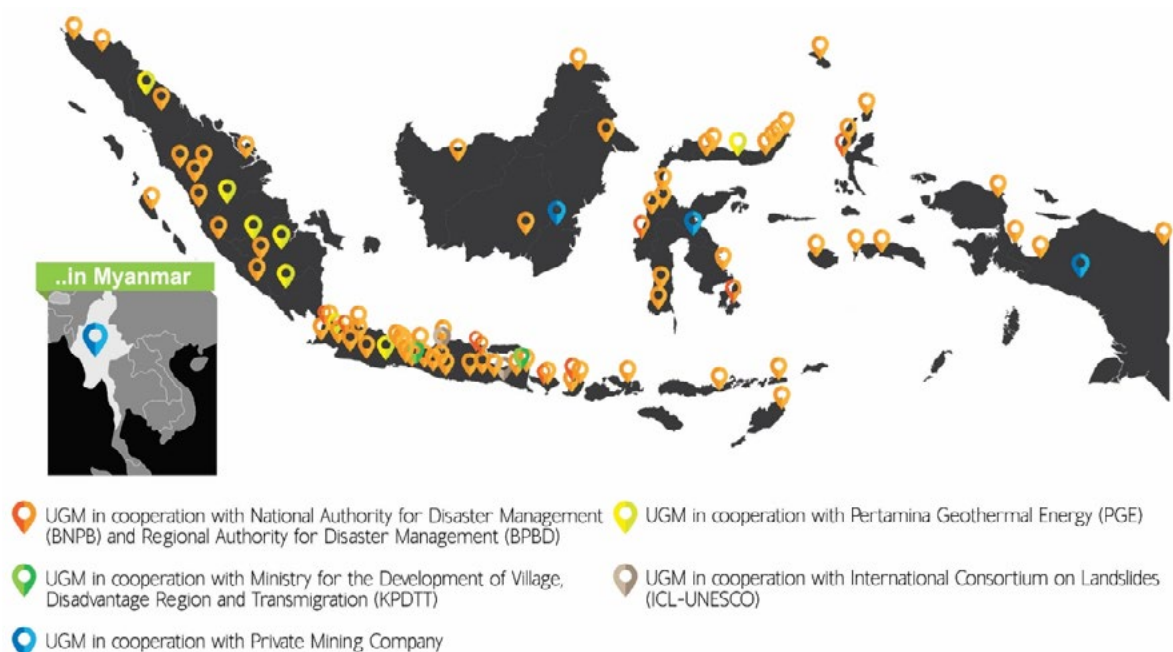


Figure 1 Installation of Early Warning System in Indonesia and Myanmar

with BPBD was encouraged to develop their own Standard Operation Procedure (SOP) for evacuation, evacuation map, and community's preparedness team with the approval from authorized agency or experts. A self-evacuation drill is also conducted once in a year to ensure both local government, the community, and preparedness team is aware on what to do when the warning was issued by the early warning equipment.

Results and Impact

Since 2007, landslide monitoring systems have been implemented in Indonesia, starting with a manual monitoring device, paper-recorded device, utilization of data logger through to using real-time monitoring systems. This universal standard accommodates is carried out to support the implementation of a landslide early warning system in Indonesia where the trial of this proposed methodology was done. Both approaches (technical and social), supported with continuing education and research, are expected to be able to involve all of the related stakeholders, reduce the cost of system implementation and maintain its sustainability.

The implementation of this standard has been strengthened the community resilience to landslide disaster and proved to be able to save lives when the disaster occurs. For example, this system was able to save 100 households in Aceh Besar when a landslide occurred in 2015. Universitas Gadjah Mada in collaboration with local BPBD was able to conduct evacuation in sufficient time when the sirens from the early warning system rang. This experience proved that the whole system in the standard have a significant impact on saving human lives and reducing casualties. This standard has also become an important guideline for disaster management agency in Indonesia. Therefore, Indonesian government has taken a serious action by included this standard as a reference for National Medium-term Development Plan (2015-2019) for reducing disaster risk especially for landslide.

Challenges and Lessons Learned

The application of ISO 22327 in Indonesia requires consistent strategy and support from the government, universities, NGOs and private sectors for the implementation of community-based projects. However, there is still a gap and disconnect between the institutional and strategic approaches to disaster risk reduction which will affect the effectiveness of

community-based projects on landslides prone areas. Based on previous experiences when implementing this standard system since 2012, there are few key challenges and unexpected conditions that need to be prepared. The factor of success in this particular landslide early warning systems is the multi-stakeholders participation. However, coordination among stakeholders can be very weak.

Another obstacle in general is the difficulties faced by disaster risk reduction programs. The level of local community awareness and preparedness is not constant at any given time. Usually after experiencing a disaster, the community preparedness levels can be high, however it is likely to decrease over time. The use and maintenance of the monitoring and warning devices tend to become neglected as community awareness decrease. For example, the landslide early warning system was installed in early 2015 in Pariaman, West Sumatra, Indonesia. An evaluation and monitoring of the devices is conducted in December 2015 to ensure the sustainability of the system. However, the devices were found not treated well and has not been taken care of both by BPBD nor by local community. The community assumed the landslide will not likely to occur as it has been months since the installation and no need to be excessively prepare for the disaster.

Potential for Replication

Universitas Gadjah Mada (UGM) in cooperation with the Indonesian National Authority for Disaster Management (BNPB) and the Ministry of Village, Development of Disadvantaged Regions and Transmigration of Indonesia (KEMENDESRA) has developed simple and low-cost equipment for landslide monitoring and early warning since 2007. This model of landslide early warning has been quite effective and strategic to improve the community resilience at the landslide vulnerable villages. Other than that, community preparedness should be strengthened by conducting dissemination of information and communication, developing standard operation procedure and evacuation map, as well as strong commitment between related stakeholders and community. All of these approaches are easily followed by the communities and strongly recommended to be implemented in other hazard risk areas.

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