PEOPLE-CENTRIC EARLY WARNING SYSTEM AS AN IMPLEMENTATION OF EMERGING TECHNOLOGY SOLUTION FOR DISASTER RISK REDUCTION IN MALAYSIA

Liyana Hayatun Syamila Ramlee*[1], Khamarrul Azahari Razak[1]

1. Disaster Preparedness and Prevention Center (DPPC), Malaysia-Japan International Institute of Technology (MJIIT), Universiti Teknologi Malaysia (UTM)

Jalan Sultan Yahya Petra, 54100 Kuala Lumpur, Malaysia

** E-mail: liyanahayatunsyamila@graduate.utm.my*

ABSTRACT

Asia pacific is known as the world disaster prone region, which have recorded one life lost every 13 minutes, and Malaysia is not an exception. It was reported that national disaster induced human- and economic losses was 220% increment in comparison between the 2014/2015 northeast monsoon and 2021/2022. Due to climate change and extreme weather event, an unexpected debris flow had strike Jerai Geopark, Yan, Kedah in 2021 during Covid-19, which killed 6 people and economic losses of total RM75 million. It is a waking up call for the needs to strengthen the societal disaster resilience. To achieve the national and global agenda of Sendai Framework for Disaster Risk Reduction 2015-2030, the very first Debris Flow Early Warning System (EWS) had been developed with the involvement of government, private, academia, NGO and community at the vicinity of Jerai Mount. This high impact initiative, using the advanced technology from Japan, added with the training of vulnerable community and local agencies, makes the science and technology to be understood by everyone. EWS needs to be people-centered and end-to-end, to enhance the resilience of local stakeholders and local champion for early response towards geological disaster risk reduction. With the series of stakeholder engagement with local communities and agencies, a disaster warning system framework had been developed to support geological risk-informed decision-making for action at a local level.

KEY WORDS

People-centered Early Warning System, Debris Flow, Geological Systemic Risk, Disaster Resilience, Community-led Disaster Risk Reduction (CLDRR), Disaster Management

1. INTRODUCTION

Debris flow is one of the type of landslides that pose a significant threat of life and property due to their rapid moment, capacity to swiftly destroy objects in their trajectory. Over the past four decades, globally climate-related disaster has increased 83% with 3 trillion economic losses and more than 4 billion affected people. Malaysia had recorded high mortality rate due to geological disaster debris flow with the total of 442 death and economic losses estimated RM904.2 million, in the last three decades.[1] Early Warning for All by 2027 has initiated by UNDRR as EWS are widely regarded as the 'low-hanging fruit' for climate change adaptation due to their cost-effectiveness of protecting people and assets from geological hazard.[2] The objectives of this study is (i) to integrate the knowledge of science and technology with Local, Traditional and Indigenous Knowledge (LTIK) for enhancing the Community-led Disaster Risk Reduction (CLDRR) agenda, and (ii) to develop a people-centric early warning system and disaster warning system framework. The launching of Resilience Living Lab, a multi-stakeholder platform with transdisciplinary approach in developing a culture of resilience and translating the local disaster risk reduction agenda through filed experience, is a unique approach for the sustainability of disaster risk reduction (DRR) in Malaysia. This study uses DRR model to support the co-implementing of CLDRR in the tourism dominated region. It is sustainable to empower local champion in disaster risk management in the process for decision making, and to achieve long-term resilience, enhance the capacities to oversee risk reduction strategies, monitor potential risk and empower to take action to minimize the impact. This study bridging the gap of scientific knowledge to be understood by the exposed community towards climate-induced disaster.

2. METHODOLOGY

2.1 Development of People-centric Early Warning System

According to UNDRR, Early Warning Systems provide more than a tenfold return on investment, and with 24 hours' notice earlier of an impending hazardous event can cut the ensuing damage by 30%. Countries with limited early warning coverage have disaster mortality eight times higher compared to countries with comprehensive early warning coverage.[3] The first debris flow EWS in Malaysia is located at Titi Hayun, Yan, Kedah. This is an initiative by the government, led by Department of Mineral and Geoscience Malaysia and smart collaboration with Universiti Teknologi Malaysia, and also direct involvement of local communities and agencies. A complete system consists of wire-cable detection, vibration sensor, and siren system coupling with historical inventory

analysis, hazard mapping, exposure assessment and systemic risk evaluation.[5] It aligns with Target G of the Sendai Framework that aims to substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessment to people by 2030.[4] People-centered early warning system of Mount Jerai improve the disaster resilience and capacity of vulnerable communities.

2.2 Community-led Disaster Risk Reduction (CLDRR)

The wisdom of the local people is valuable, as they grow up at that area. Their knowledge can be used by academia and experts to produce strategy and action plan accordingly. The integration of scientific knowledge and LTIK through series of Community-based Disaster Risk Management (CBDRM) to empower and build capacity of local communities, successfully lead to Community-led Disaster Risk Reduction (CLDRR) that had been co-design and co-organized by the community themselves. CLDRR contribute solution to the complexity of knowledge for disaster resilience that includes the participation of public, private, academia, NGO and communities. Few activities had been held that contribute to data collection such as Disaster Imagination Games (DIG) to identify the evacuation route, Treasure Hunt Debris Flow Yan to educate about debris flow impact, build-back-better of livelihood and safe temporary shelter. Resilience Living Lab Yan is a perfect platform for learning from the past disaster and improve humanitarian work by fostering research, innovation and cross-specialty collaboration network.

2.3 Stakeholder Engagement and Focus Group Discussion (FGD)

Series of Stakeholder Engagements and FGDs was conducted in this study to gather information from cross-sector agencies and community leaders. Dissemination of disaster output gained from scientific knowledge should be leverage to the communities and agencies at local level. Risk communication is an important tool before, during and after disaster. For better coordination and management, stakeholder engagement with multi-sectoral is important to gather input and instill shared responsibilities. Besides that, the usage of Internet of Things (IoT) that can be used to transfer data from upstream directly to the local authorities, is useful for risk-informed decision making and early action.

3. RESULT & DISCUSSION

The coupling of scientific knowledge and LTIK is the input for disaster preparedness, mitigation and resilience of the people at the vulnerable and prone to disaster area. There are two outputs developed to enhance the community-led disaster risk reduction and resilience, that is the DRR Yan Model and Disaster Warning System Framework. The holistic DRR Yan Model includes 5 main criteria, which are, (i) Smart collaboration (public-private-academia-NGO) in the disaster risk reduction (DRR) agenda, (ii) Empowerment of vulnerable communities and strengthening local champions, (iii) Local resilience culture, (iv) Science, technology & innovation in local DRR strategy formation, (v) National agenda in DRR & local resilience. Secondly, the 3E concept are promoted; Early Information, Early Decision and Early Action (See Figure 1 below). This framework includes local disaster management committee, technical agencies, local authorities and local champion.

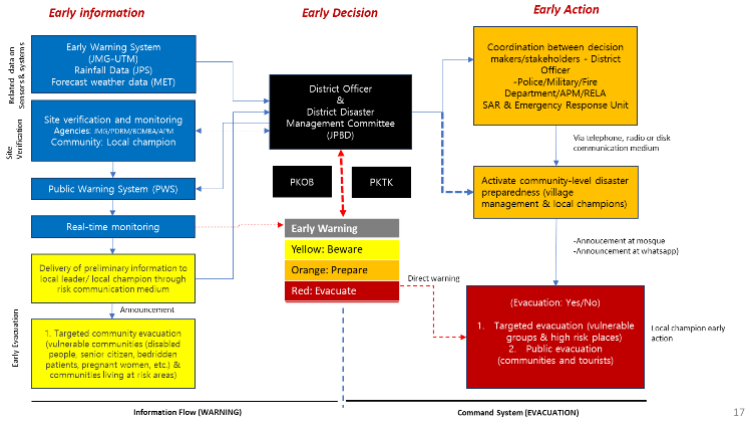

Fig.l: Disaster Warning System Framework.

4. CONCLUSION

In conclusion, this study is a way forward to understand local systemic risk and strengthening local DRR agenda for an effective risk governance (vertical and horizontal) towards enhancing overall disaster risk management in Malaysia. Transdisciplinary- and whole-society-approach is a secret recipe to accelerate localized DRR strategies and support the 2030 global agenda and beyond.

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