Topic: Innovative Application of Disaster Prevention Technology

Recent flash floods and landslides in northern mountainous Vietnam: quick assessment and response measures

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Abstract

In early August 2017, flash flood caused landslides affecting the Nam-Ho Dien Bien district of Lai Chau Province, the Mu Cang Chai district of Yen Bai Province, and the Muong La district of Son La province. Many houses and buildings were washed away due to the erosion of land or by the force of high-velocity flowing water, and destroyed by the collision of rocks. The CCNDPC of Vietnam reported 26 casualties and 15 people missing. The landslides left 231 houses completely destroyed, 425 houses damaged, 338.5 hectares of rice field destroyed, national provincial and district roads eroded and 145 irrigation systems damaged. Because of lack of prevention measures, the total damage was very heavily concentrated on housing, crops and people. As this type of disaster hit frequently in the area, some urgent, mid-terms, and long-terms responses measures are proposed to be taken in the future.

Key words: Flash flood, landslide, northern mountainous Vietnam, response measures, early warning system.

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1. Introduction

In early August 2017, flash flood caused landslides affecting the Nam-Ho Dien Bien district of Lai Chau Province, the Mu Cang Chai district of Yen Bai Province, and the Muong La district of Son La province. The Government of Vietnam through the Central Steering Committee of Natural Disaster and Control (CCNDPC) of Vietnam, swiftly responded to the disaster. The CCNDPC of Vietnam reported 26 casualties and 15 people missing. The landslides left 231 houses completely destroyed, 425 houses damaged, 338.5 hectares of rice field destroyed, national provincial and district roads eroded and 145 irrigation systems damaged.

2. Outline of the disaster

The surveyed area is about 10km along to NamPam river, in MuongLa district, SonLa province in Vietnam (Figure 1). After a quick assessment, several observations could be made:

- Flood discharge of the NamPam river far exceeded the capacity of the original river channel, with high concentration of debris contained in the water (debris flow) (Figure 2).
- The river channel expanded from the original width and flood water flew almost over the whole valley bottom.
- The debris flow eroded the river bed and hillsides on both sides of the valley. The flow also deposited vast amount of sand and rocks on the valley bottom.
- The source of the sand and rocks was provided from the hillside collapse and the erosion of river bed and the hillsides.
- The rough estimation of the total volume of sediment provided was several hundred thousand to over a million cubic meters.
- Many houses and buildings were washed away due to the erosion of land or by the force of high-velocity flowing water, and destroyed by the collision of rocks. (Figure 3).

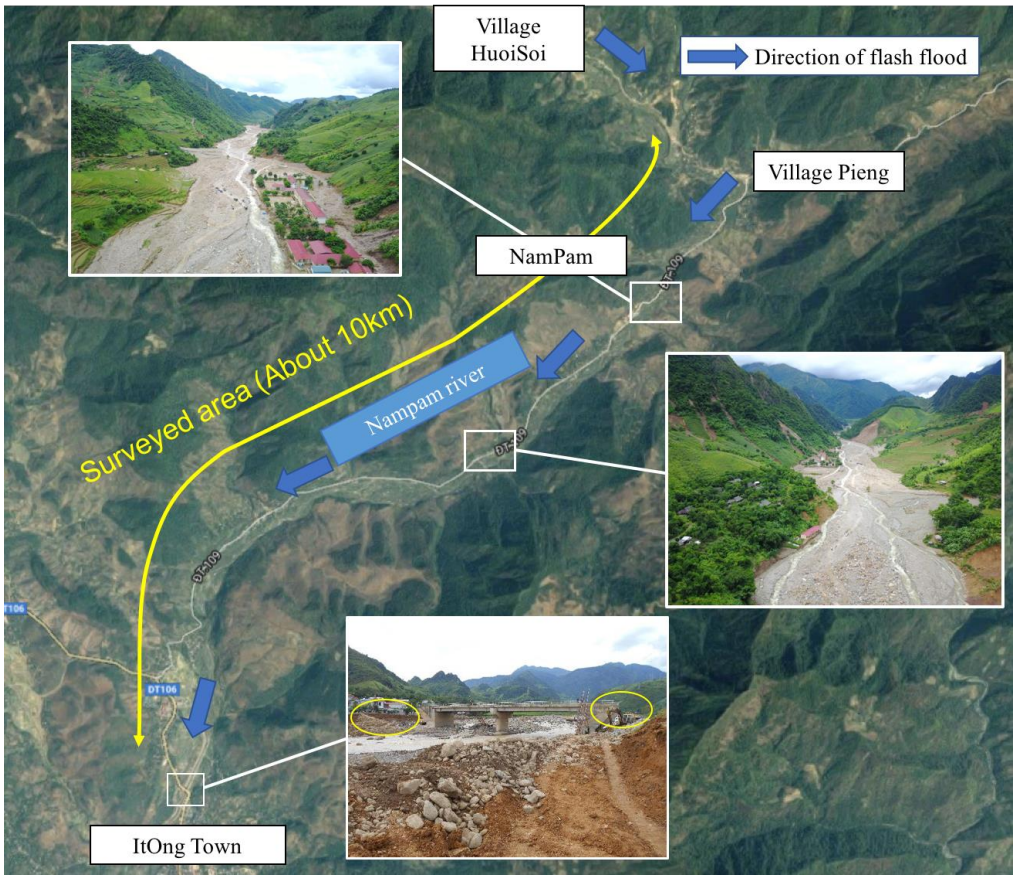

Figure 1 Surveyed area (MuongLa district, SonLa province).

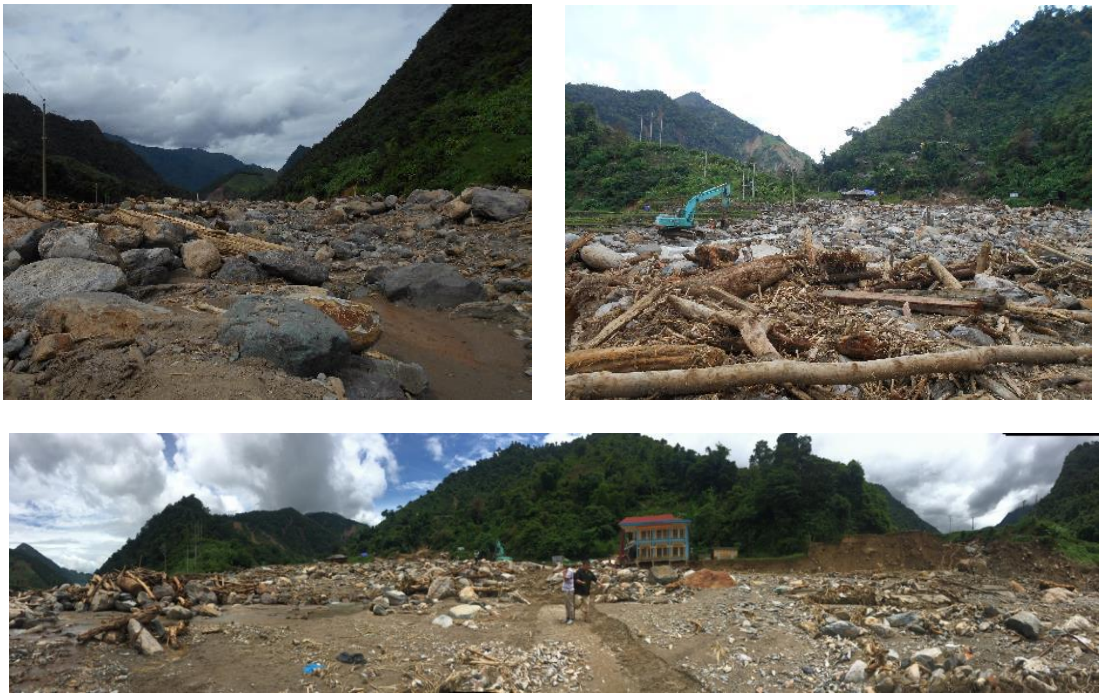

Figure 2. Flood water flew almost over the whole valley bottom. The valley was coved by sand, rock and drift wood.

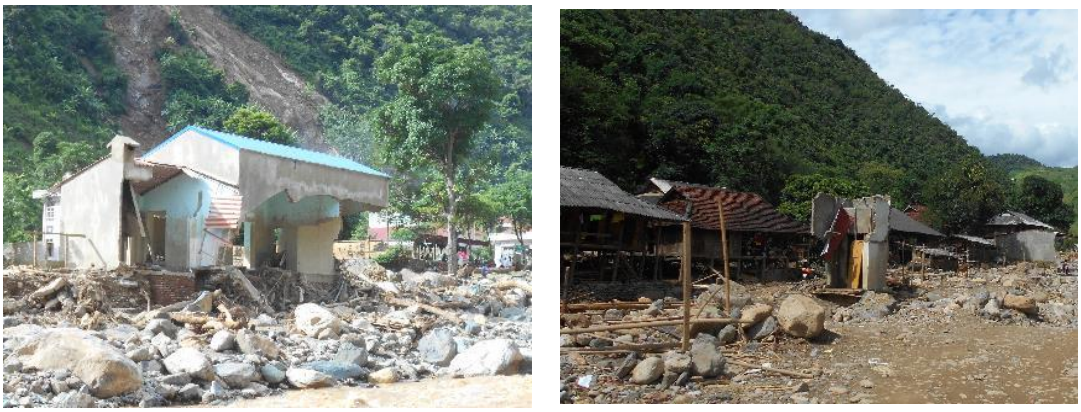

Figure 3. Many houses and building were swept away or destroyed.

3. Cause of the phenomena

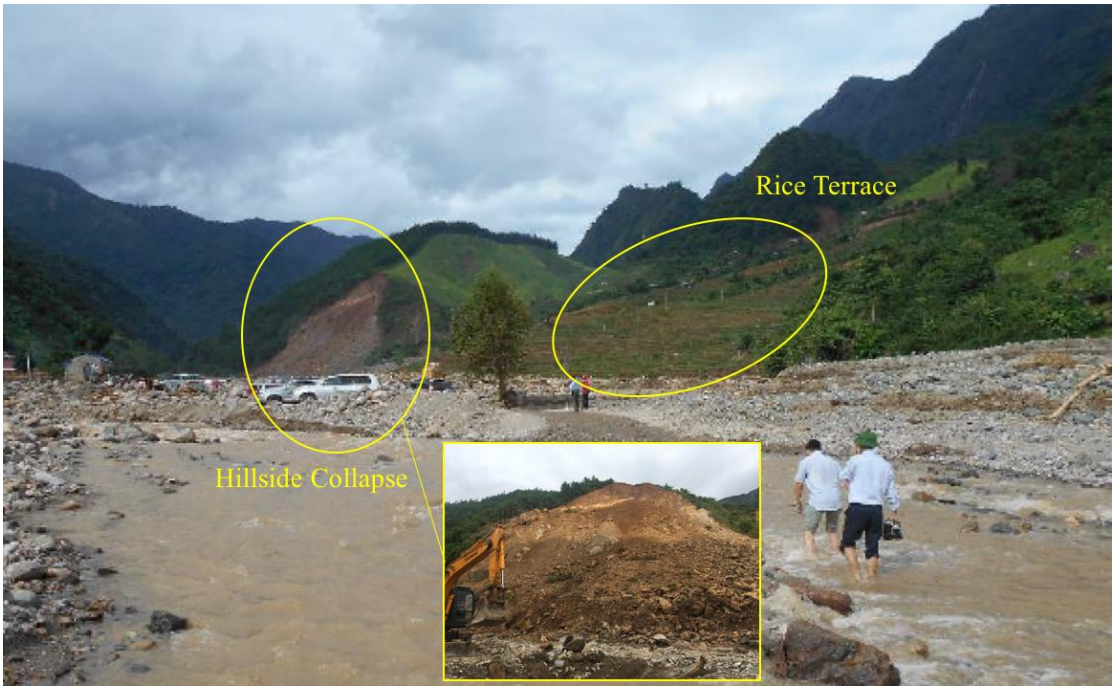

Figure 4. Hillside collapse and rice terrace (deposit of landslide).

It is evident that the valley was recurrently hit by landslide and debris flow. People have been using the land formed by the deposit of sand and rocks formed by landslide or hillside collapse as rice terrace (Figure 4). People have been building houses on the deposit of sand and rocks caused by debris flow in the past.

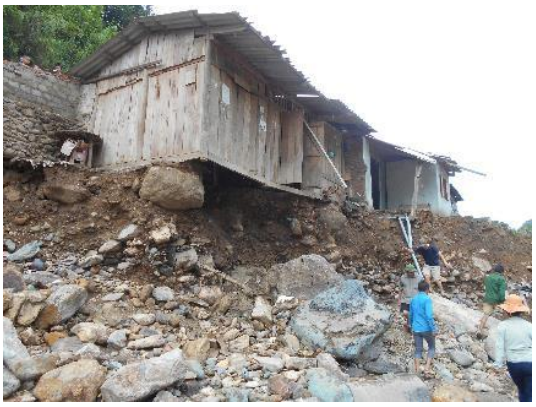
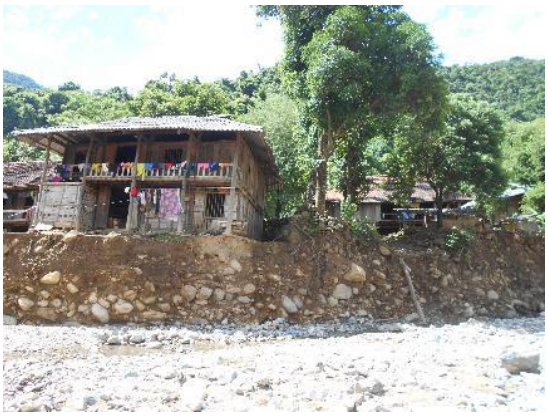

Figure 5. The land below damaged houses and land exposed by side erosion contains big rocks.

This can be seen from looking at the land below the houses that were washed away, or the land exposed by the side erosion (Figure 5). The land contains many big rocks. It means the potential of the damage caused by debris flow is very high in the valley. However, the scale of the debris flow which occurred this time was extraordinary large.

The direct cause of the debris flow was the intense downpour occurred from the midnight of 2 August to the morning of 3 August. At the same time, there is a high possibility of saturation of the earth due to the rain beforehand. (So far, we only have the daily rainfall data. We should carefully review the hourly rainfall. This will help us explore the effectiveness of introducing "sediment related disaster alert system", based on the rainfall monitoring.)

4. Measures to be taken

4.1 Urgent measure to the damaged area

Vast amount of unstable sediment still exists in the valley. If strong rain comes, another debris flow can occur easily. In order to avoid the occurrence of damage to people who are taking shelter in the disaster-hit area, following measures should be taken: (i) Safe areas to take shelter must be provided for evacuees, who lost their houses. Unplanned reconstruction of houses must be prohibited to avoid the damage by possible debris flow; (ii) An alert system should be installed based on the monitoring or rainfall in the disaster-hit area. Criteria for issuing alert should be established.

4.2 Short-term measures to the damaged area

The reconstruction of damaged area should be based on the "build back better" concept. Safe residential areas to reconstruct the houses of the affected people should be developed and provided. The areas should be safe from the

sediment-related disasters which can occur in the future.
Areas at high disaster risk should be identified and noticed to the residents by indicating with signs. Knowledge on the sediment related disasters should be provided to the residents.

4.3 Short-term measures to the damaged area

"Sediment related disaster alert system" should be established to provide residents in disaster-prone area effective information for safe evacuation. (reference: the system in Japan) The system should be operated and maintained by an organization close to the community, so that the effectiveness and sustainability can be secured. This initiative should be implemented in combination with awareness raising and educational activities of residents.
The obligation of the disaster risk assessment and risk reduction activities should be legislated. At the moment, assessment and publication of disaster risks are not obligatory on the government at any levels. In order to promote the implementation of risk assessment, legislation with enforcement is necessary. At the same time, the requirement of implementing measures to reduce the risks should be incorporated in the legislation. The measures comprise of the followings 3 pillars: (i) Structural measures to protect areas with high social and economic importance; (ii) Regulation of land management; and (iii) Early warning (alert) system and measure to promote effective evacuation.

5. Conclusion

Quick assessment and some response to flash flood and landslide in northern Vietnam has been presented. The paper gives an overview of recent flashflood disaster in Vietnam. Because of lack of prevention measures, the total damage was very heavily concentrated on housing, crops and people. As these types of disaster hit frequently, in near future, early warning system should be equipped, combination with increasing community disaster awareness.

6. References

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