第Ⅱ部門

Risk assessment for sediment disaster in Taiwan

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1. Introduction

After the 921 Chi-Chi Earthquake in 1999, in recent years, many disasters such as landslides and debris flows, were taken place in hillside fields in Taiwan. Therefore, measures to prevent disasters were paid more attention by government of Taiwan. Measures to prevent disasters with engineering structures and shock-proof structure are called structural (hard) measures and measures such as hazard forecasting, disaster education and evacuation training are called non-structural (soft) measures. Because of high frequency of disasters, people start to know the hard measures are not the only way to mitigate disasters, even though hard measures could efficiently ease threaten of disasters. In recent years, many researchers become take focus on the studies of soft measures. Besides, when planning a mitigation program, the risk assessment of disasters is important and indispensable. Therefore, in this study, a method to evaluate the risk of disaster potential zone was established. I hope that the method of risk assessment could be an important way for decision-makers to make mitigation plans better.

2. Main Framework of Risk Assessment

It's known that risk is the expected loss resulting from interaction between natural or human induced hazards and vulnerable/capacity conditions. Conventionally risk is expressed by the function:

Risk = func. (hazard, vulnerability/capacity)

In this function, the key terms are defined as follows:

- Hazard is a potentially damaging physical event, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.
- Vulnerability is a set of conditions and processes resulting from physical, social, economical and environmental factors, which increase the susceptibility of a community to the impact of hazards.
- Capacity is the positive factors that increase the ability of people and the society they live in, to cope effectively with hazards, which increase their resilience or reduce the susceptibility. In the study, we defined it as resilient capacity.

3. Studying area, Suili countryside in Taiwan

In the study, the Suili countryside was chosen as the studying area (Figs. 1.1). Suili countryside is located on the middle of Taiwan. There were over 100 sediment disasters happened during 2001 to 2005. Most of disasters were landslide and debris flow, and these disasters destroyed buildings, roads, and several missing people. There were 25 debris flows in this countryside, and the landslide areas are about 265.5km2.

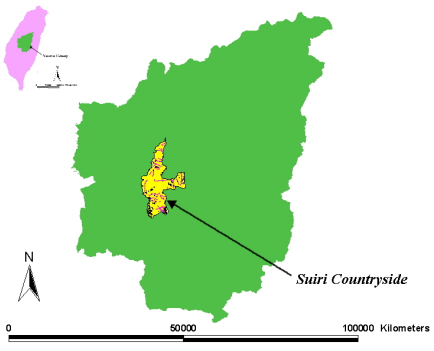

Fig. 1.1 The distribution of debris flow in Suili Countryside

4. The framework of the study

To make a risk assessment, in this study, we evaluated a risk from hazard, vulnerability and capacity (Fig. 1.2). In the part of hazard, debris flow and landslide was evaluated by flo-2D software and logistic regression respectively. In the part of vulnerability, land-use figure was used to assess. In the part of resilient capacity, there were two aspects to evaluate it, including ability of residents to resist natural hazard and community resource for preventing from disasters. Finally, integrating hazard, vulnerability and resilient capacity, the risk is calculated. Then the risk was used to plot the risk map.

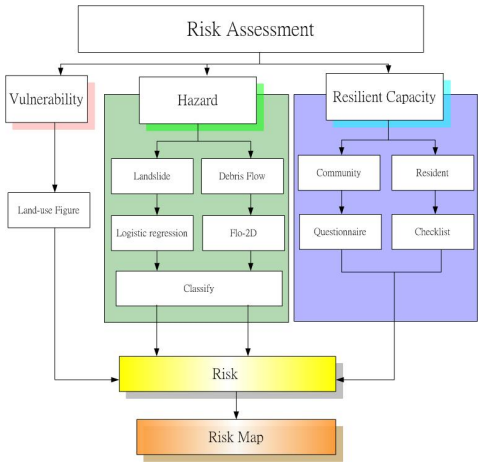

Fig. 1.2 The framework of the study

5. The result of risk mapping

The risk map, as shown in Figs. 1.3 and 1.4, represents the distribution of risk for a specific hazard. The risk map would show the expected loss of an area, not the risky level of an area.

In the maps, we could clearly understand the distribution of risk, the blue area represents that the risk is zero. It shows that in this area if there is disaster happened, it would be expected without any loss for the specific disaster. According to the distribution of risk, the resident could understand the risk level of the place they lives in.

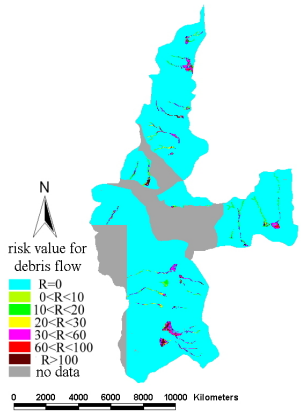

Fig. 1.3 The risk map for landslide of Suili Countryside

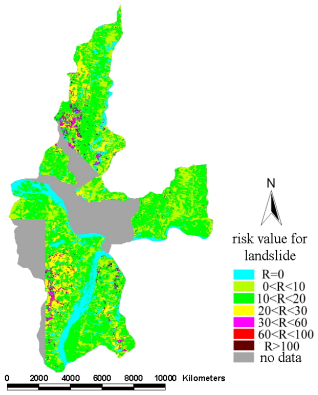

Fig. 1.4 The risk map for debris flow of Suili Countryside

6. References

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