Study for Preparation of a Hazard Map of Sediment Disaster with the National Building Research Organization of Sri Lanka (Research period: from FY2017)

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1. Introduction

In January 2018, the NILIM entered into a memorandum of cooperation for research on sediment disaster countermeasures with the National Building Research Organization ("NBRO") of Sri Lanka.[1] Accordingly, a joint research was conducted on applicability of the numerical simulation developed in Japan in order to prepare a hazard map of sediment disasters in Sri Lanka as early as possible. This paper reports results of this joint research.

2. Contents and results of discussion

Sri Lanka prepared "Landslide Hazard Zonation Map" by assessing the risk of slope failure and published it. This Map, however, does not show areas where sediment generated by slope failure is expected to reach. In addition, since many houses stand on slopes in Sri Lanka, it is very important in disaster prevention to forecast area where sediments are expected to run off. We therefore studied the applicability in Sri Lanka using the two-dimensional debris flow simulation "Hyper KANAKO" [2], which can forecast the area of runoff / deposition of sediments generated by slope failure. First, we conducted the numerical simulation of slope failures that occurred in Koslanda, Sri Lanka, after advancing the study on configuration methods, etc. actually practicable in Sri Lanka for topographic maps and parameters. Fig. 1 shows an aerial photograph immediately after disaster and calculation results. According to the calculation results, deposition of sediments is much more than actual deposition in the collapsed area but a lot of sediments are deposited in the (red frame) area where a lot of sediments were actually deposited. In addition, the area of deposition calculated was larger than actual but the reaching distance was almost the same. The accuracy of calculation results is considered to have been affected by the slightly coarse topographic map of Sri Lanka (1/10,000). Further, in order to confirm how difference in input conditions affects calculation results, we conducted trial calculations, assuming future forecast calculations, by changing the ratio of fine-grained sediments, sediment volume, hydrograph, and grain-size distribution under the condition where no input conditions other than location and scale of collapse and topographic data are unknown. The result showed that the ratio of fine-grained sediments has a large effect on the reaching range. Consequently, it was confirmed that even with topographic data of coarse accuracy, forecast of reaching range, etc. is possible.

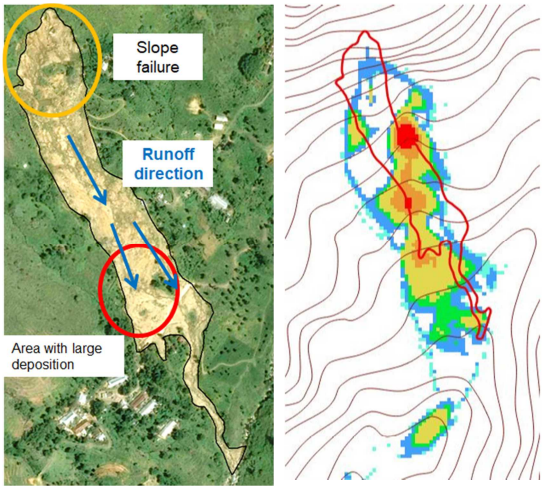

Fig.1 Results of numerical simulation (Slope failure in Koslanda)

3. Conclusion

In addition to technical study, this joint research also intends to transfer techniques for preparing a hazard map for sediment disasters by inviting three young researchers from the NBRO. In the future, while using、Landslide Hazard Zonation Map as well, we are going to visit Sri Lanka to exchange opinions and continue discussion for early preparation of a hazard map through participation in workshops, field survey, etc.

Note that for inviting researchers from the NBRO, we received a subsidy from the Civil Engineering International Research Exchange Support Plan of the Public Works Research Center.

☞See the following for details.

1) Civil Engineering Journal, vol. 60, No.5 p. 41
2) Hyper KANAKO Workshop website: http://www.hyper-kanako.com/