International Conference
Analysis and Management of Changing Risks for Natural Hazards
18-19 November 2014 l Padua, Italy

DO1

Dynamical Based Risk Analysis of Debris Flows

Peng Cui
Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, Chengdu, China

Corresponding author details:
Cui Peng
Professor
Key Laboratory for Mountain Hazards and Earth Surface Process, CAS
Institute of Mountain Hazards & Environment, CAS
9#, Section 4, Renminnanlu Avenue, Chengdu 610041, Sichuan
People's Republic of China
Tel. +86 28 85214421
Fax. +86 28 85238460
E-mail. pengcui@imde.ac.cn

Keywords: debris flow, risk analysis, vulnerability, Scale amplification

Abstract
Debris flows occur when masses of poorly sorted sediment, agitated and saturated with water, surge down slopes in response to gravitational attraction. Debris flows are of great concern because they often cause catastrophic disasters due to the long run-out distance and large impact forces. It is noted that many mountain towns in China are located on the alluvial fans of debris flows, making them vulnerable to large, multiple, and even simultaneous debris flows during heavy rainfall. Without emergency management planning, such flows, can lead to extensive loss of life and property. This study illustrates how the hazardous process of natural debris flows can begin several kilometers upstream as a complex cascade of geomorphic events (failure of landslide dams and erosion of the sloping bed) can scale to become catastrophic discharges. Based on the understanding of the physical process of debris-flow formation and evolution, new quantitative methods of debris-flow risk assessment are developed. The vulnerability of different hazard-affected objects and the hazards mapping of the correlated township can be determined. This analysis indicated that the calculated risk zones coincide with the actual distribution and the severity of damage in the debris flow event, which suggests that the risk assessment is consistent with results from the actual disaster. The risk analysis of debris flows is an effective way of hazards mitigation.