

斜面土體崩壞潛勢與土石流發生潛勢之相關研究

- 以嘉義豐山集水區為例

連惠邦^[1] 林秉賢^[2] 莊政霖^[3] 黃俊霖^[3]

摘要 本研究利用山腹邊坡斜面崩壞機制配合地下水位上升公式，推導出邊坡崩壞係數之計算公式，作為推估集水區岸坡土體崩壞潛勢之用。此外，藉由蒐集崩壞潛勢所需之參數，以地理資訊系統分析集水區境內平均坡度及有效集水面積，推估出區域內之地文潛勢，並分析因邊坡崩壞土石進入河道之料源多寡推估有效土體崩壞潛勢，最後結合地文潛勢與土體崩壞潛勢定義土石流發生潛勢。

在模式驗證方面，本文選取嘉義豐山村嘉義 001 土石流潛勢溪流及其集水區作為研究對象，以 90 年桃芝颱風土石流發生事件，探討該溪流兩岸直接崩落土石、坡度及集水區大小三者之間相互關係，並利用地理資訊系統建構該集水區坡面崩壞潛勢與地文潛勢所引發土石流發生潛勢之分析機制，配合降雨量可即時獲得集水區境內不同之崩壞潛勢及土石流發生潛勢。分析結果，在河道兩岸附近兩百公尺準確率達 76.4% 以上，遠離河道二百公尺以上則誤差較大；進行水文潛勢及地形潛勢分析時，較容易受到區域中不同水文、地文因子所影響，進而影響土石流發生潛勢之推估。所採用方法若再配合更準確之雨量預測系統及地質調查成果之改善，進行崩壞潛勢及土石流發生潛勢分析，則有利相關單位進行防災監測與土地管理之參考。

關鍵詞：斜面崩壞機制，崩壞係數，土石流發生潛勢。

Relationship between Slope Failure Potential and Debris Flow Occurrence Potential- Case Study of Chai-Yi Feng-Shan Watershed

Hui-Pain Lien^[1] Bing-Shyan Lin^[2] Cheng-Lin Chuang^[3] Chun-Lin Huang^[3]

ABSTRACT This paper is based on the theory of the hill slope landslide triggering mechanism and conducted with the rising underground water formula to evaluate the landslide outbreak coefficient formula and estimate the landslide outbreak potential of a watershed. Later, we collect factors for the landslide outbreak coefficient using the ArcGIS system to establish and estimate the landslide potential of the studied area. The average slope and watershed area to estimate the geological

[1] 逢甲大學水利工程與資源保育學系教授兼任逢甲大學營建及防災研究中心主任

Professor and Director, Department of Water Resources Engineering and Construction and Disaster Prevention Research Center, Feng-Chia University, Taichung 407, Taiwan, R.O.C.

[2] 逢甲大學土木及水利工程研究所博士班研究生兼任逢甲大學營建及防災研究中心助理（通訊作者）

Ph.D. Candidate, Department of Civil and Hydraulic Engineering Institute and Construction and Disaster Prevention Research Center, Feng-Chia University, Taichung 407, Taiwan, R.O.C. (Corresponding Author)
E-mail:p9112267@fcu.edu.tw

[3] 逢甲大學水利工程與資源保育學系碩士

Master, Department of Water Resources Engineering, Feng-Chia University, Taichung 407, Taiwan, R.O.C.

potential of the area is analyzed. Finally, we examine the amount of outbreak landslide mass to establish the effective soil mass outbreak potential and correspond this with geologic potential to define debris flow occurrence potential.

For our case study and verification, this article chose Feng-San watershed in Chai-Yi County as the study area. We discuss the relationship of landslide mass, slope and watershed size which directly effect lateral landslide along the river using the abovementioned established model to distinguish potential coefficient in ArcGIS and find the debris flow potential of each divided small watershed. The results show the actual outbreak amount of this area compared with the model prediction 200m beside the river slope is 76.4%, but beyond 200m, the prediction is very good. Therefore, in the future, by conducting a more accurate rainfall prediction model and geologic survey, the predictions of landslide outbreak potential and debris flow occurrence analysis will give disaster prevention facilities and land management organizations a better future reference for mitigation.

Key Words: mechanism of hill slope landslide outbreak theory, landslide outbreak coefficient, debris flow occurrence potential.