遙測及景觀分析技術於崩塌地判釋與變遷之研究

周天穎[1]　　雷祖強[2]　　陳駿賢[3]

摘　　要　近幾年來，因崩塌地而引起的災害時有所聞，如山崩、土石流、洪水等問題。而欲調查上述問題等情況，人們經常利用遙測技術來達此目的，但由於衛星影像對於崩塌地與河谷裸露地之光譜特性幾乎相近，導致在分類上極易產生混淆。故本研究利用其他的輔助資訊（坡度門檻值）進行衛星影像有效分類，並將結果導入地景生態之概念予以分析探討，以作為未來集水區保育與規劃管理之用。

　　研究中以陳有蘭溪流域為研究範圍，收集 1998 年、1999 年及 2002 年之 SPOT 衛星影像，利用監督式分類法分類後取得地表覆蓋資訊，然後再藉由數值地表模型（Digital Surface Model, DSM）探討坡度與面積的變化，最後選取坡度因子 21 度，作為區隔崩塌地與河谷裸露地之門檻值，進而達成區分隔離之效果。另外，運用景觀生態學原理，將"崩塌地"以嵌塊體的概念導入景觀生態分析程式 FRAGSTATS 當中，進行各類型形狀指數之運算與分析。研究結果發現：運用景觀生態指數中嵌塊體指標、邊緣指標、形狀指標之分析，至 2002 年為止整個研究區內崩塌地在面積上是呈現先增後減的狀態，而且形狀有越來越不規則且破碎程度越來越嚴重之趨勢，這顯示集水區內因崩塌地而破壞的植生環境，目前有逐漸回復之情形。

關鍵詞： 崩塌地判釋、景觀生態學、數值地表模型。

Remote Sensing and Ecology Landscape Technology for Studying Landslide Recognition and Change

Tien-Yin Chou[1]　Tsu-Chiang Lei[2]　Chun-Hsien Chen[3]

ABSTRACT　In recent years, Taiwan has suffered numerous natural disasters involving landslides, debris flows, floods, and so on. To reduce such disasters, remote sensing technology has been used to detect geological changes in landslide-prone areas. Nevertheless, the optical spectrum characteristic of satellite images has provided confusing information about landslide area and dry riverbeds. Therefore, additional information (gradient threshold) is very important for classification of satellite images. This study also used ecology landscape and statistical methods to measure and describe landslide changes in the study area.

　　The study site is located in the Chen-Yu-Lan Watershed of Nan-Tou country. Earth cover information from SPOT images in 1998, 1999 and 2002 was obtained and the supervised classification method (Maximum Likelihood Classification, MLC) was used to classify satellite images. In addition, variation in the gradient and area

〔1〕逢甲大學土地管理學系副教授暨地理資訊系統研究中心主任
　　Associate Professor and Director, GIS Research Center, Feng Chia University, Taichung 407, Taiwan, R.O.C.
〔2〕逢甲大學地理資訊系統研究中心研究助理教授（通訊作者）
　　Research Assistant Professor, GIS Research Center, Feng Chia University, Taichung 407, Taiwan, R.O.C. (Corresponding Author)
　　E-mail:eric@gis.fcu.edu.tw
〔3〕逢甲大學土地管理學系碩士班研究生
　　Graduate Student, GIS Research Center, Feng Chia University, Taichung 407, Taiwan, R.O.C.

change was analyzed using the Digital Surface Model (DSM) data, and gradient 21 degree of assistant information was used to distinguish between landslide area and dry riverbed. Furthermore, according to the ecology landscape theory, the concept of "Patch" (means landslide) was used to calculate many ecology landscape indexes using the FRAGSTATA software. This investigation showed that when using the ecology landscape measurement indices of patch, edge and shape for landslide area of each sub-watershed, the amount of landslide area in the study area has increased in recent years, while the area of the sub-watershed increased in 1999 (because of the Chi-Chi earthquake) but decreased in 2002 (because of eco-restoration). This work showed that remote sensing and ecology landscape technology could detect effectively landslide destruction and recovery of the ecological environment in the sub-watershed.