

摘要

隨著山坡地開發漸增，山坡地因土地利用不當和颱風豪雨影響，常發生坡地災害，而土壤深度為坡地災害中淺層崩塌之重要參數，政府更將土壤深度視為山坡地土地可利用限度查定之因子，顯示土壤深度於山坡地災害與管理佔有重要地位。本研究試以苗栗縣後龍河流域上游集水區為研究區域，利用地理資訊系統結合多項式羅吉斯迴歸推估土壤有效深度，依其深度範圍不同分為甚深層、深層、淺層及甚淺層，選取坡度、坡向、高程、地形曲率及常態化差異植生指標為環境因子，進行土壤有效深度推估，並以分類誤差矩陣、Kappa 指數進行模式結果評估，其中建模組之整體準確率為 76.6%，Kappa 指數為 0.65，驗證組之整體準確率為 70.5%，Kappa 指數為 0.57，結果並與空間內插法和地形濕度指數法之推估結果進行比較探討，其中一般克利金之整體準確率為 45.7%，Kappa 指數為 0.15，迴歸克利金之整體準確率為 46.7%，Kappa 指數為 0.16，地形濕度指數法之整體準確率為 30.5%，Kappa 指數為-0.05，由研究結果可知研究區內以多項式羅吉斯迴歸法進行土壤深度推估優於其他方法。

關鍵詞：土地可利用限度、土壤有效深度、多項式羅吉斯迴歸

Abstract

It is known that the slopeland disaster is usually related to the land development, improper land use and torrential rain. The soil depth is an important factor in the shallow landslide. The government of Taiwan also uses soil depth as a factor of slopeland utilizable limitation to regulate the development and conservation of a slopeland. That all shows the soil depth play an important role in shallow landslide and land management.

This research aimed to classify the effective soil depth by using multinomial logistic regression with the environmental factors. The upper watershed of the Houlong River located at the central Taiwan was selected as the study areas. The analysis of multinomial logistic regression is performed by the assistance of a Geographic Information Systems (GIS). The effective soil depth was categorized into four levels including deeper, deep, shallow and shallower. The environmental factors of slope, aspect, digital elevation model (DEM), curvature and normalized difference vegetation index (NDVI) were selected for classifying the soil depth. Error Matrix and Kappa index were then used to assess the model accuracy. In the modeling group, the overall accuracy was 76.6% and Kappa index was. 0.65. In the validation group, the overall accuracy was 70.5% and Kappa index was. 0.57.

Then, the results of model were compared with ordinary kriging, regression kriging and TWI method. In the ordinary kriging method, the overall accuracy was 45.7% and Kappa index was. 0.15. In the regression kriging method, the overall accuracy was 46.7% and Kappa index was. 0.16. In the TWI method, the overall accuracy was 30.5% and Kappa

index was. -0.05. As the results, the multinomial logistic regression method is more accurate on classifying the effective soil depth among the investigated methods in the study areas.

Keyword: slopeland utilizable limitation, soil depth, multinomial logistic regression