

不同時期之開發度對集水區逕流模擬之研究

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摘要 為瞭解坡地集水區於不同型態之土地利用，及開發對於洪峰流量及洪峰到達時間之改變與影響，本研究利用不同時期之 SPOT 衛星影像及五千分之一像片基本圖求得其土地利用型態，結合 GIS 之空間分析技術，進而推算集水區開發度。並以數值地形模型為基礎，利用地理資訊系統及 HEC-GeoHMS 模組萃取試區集水區相關水文及地文參數，最後配合 HEC-HMS 水文模式進行降雨-逕流模擬分析，藉以探討逕流歷線之最佳模擬，以及推估不同類型之土地利用改變對集水區水文特性之影響，期以瞭解不同時期集水區開發度、洪峰量及洪峰到達時間上之變化關係。

選取八掌溪上游集水區為例模擬，結果顯示：八掌溪上游之集水區由於阿里山公路在民國 71 年開闢完工後，開發度隨時間增加而增大，其中又以中寮子集水區最靠近阿里山公路，故開發最為明顯，開發度從民國 66 年之 6.6%，至民國 83 年之 7.6%，到民國 92 年之 10.2%。水文模擬方面：從民國 66 年到民國 92 年，經過 26 年之期間，逕流之洪峰時間大約提前一小時，洪峰流量增加大約 18%到 102%，逕流總量增加大約 17%到 73%。

關鍵詞：土地利用、SPOT 衛星影像、開發度。

A Watershed Rainfall-Runoff Simulation Model and its Developmental-Intensity, A Historical View

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ABSTRACT Due to overpopulation and a shortage of plains, hillside development and utilization may play a very important role in Taiwan in the future. The land use and development of watershed areas on hillsides are significantly influenced by the variation in the peak discharge and concentration time. This research selected the watershed in the upstream watershed of the Pa Chang River. Via some SPOT images and the digitized images of 1/5000 aerial map, types of land-use that were found and the development intensity in the watershed can be calculated by means of GIS's spatial analysis technique. Furthermore, the hydrological and topographical data in the test area can be extracted using the GIS and HEC-GeoHMS model with DTM-based data processing. The optimal simulation on rainfall-runoff histogram and the effect of characteristics on the watershed due to the changes in different types of land-use were analyzed by means of HEC-HMS software. The results provide us with the relationships between (a) development intensity (b) peak discharge and (c) concentration time.

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The results show the developmental intensity of watershed increased over time due to the Alishan highway which was constructed in 1982. The most obviously developed area is located at the Zhongliao sub- basin which is the nearest area to the highway. The developmental intensity was 6.6% in 1977, 7.6% in 1994, and 10.2% in 2003. Hydrological simulation results show that during the 26 years (from 1977 to 2003) peak discharge increased by about 18% - 102%. The total runoff increased by about 17% - 73% and the concentration time decreased by about one hour.

Key Words: landuse · SPOT images · development-intensity.