摘　要

由於現行水資源管理偏重於滿足人類生活發展所需，未以水資源可供給總量考量，難以達到追求永續發展的目標，本研究主要目的在於基於水量平衡概念下發展一套符合水資源永續發展原則的土地規劃決策理論與模式，來協助決策者進行土地利用管理策略之擬訂。由於土地利用管理涵蓋眾多的組成因子，而且其間又有複雜的交互作用，因此本研究以系統思維(Systems Thinking)及環境承載力的觀念來界定永續水土管理之涵義，並進一步界定永續土地利用管理中的系統組成及其交互作用的動力關係，以此動力關係結合驅動力－狀態－回應(D-S-R)架構的觀念與精神來建立永續土地利用規劃架構之決策理論。

依據上述決策理論，本研究以水量平衡、D-S-R 動力決策的觀念與方法，以 ArcGIS 及 Matlab 等軟體，建立土地利用管理優化規劃模式。本研究以頭前溪流域為實際研究案例探討，案例分析結果顯示，本研究所建立的永續土地利用管理決策理論與決策模式，能夠有效界定永續土地利用管理中的交互作用，透過不同土地利用的動力決策機制，可協助決策者在擬定土地利用配置方案時清楚掌握水、土及人類活動交互作用的結果，改善現行以行政區域進行用水規劃之缺點，以流域為系統範圍進行整體性考量與規劃，並建立土地利用水量平衡評量方法，可快速、簡易評估各區域水資源供需狀態，並據以進行水資源調配與土地利用規劃優化配置，達到經濟發展與環境保護之永續發展目標。

ABSTRACT

The current water resources management framework mainly considers the needs of human development, making it difficult to achieve sustainable development. Therefore, this study aimed to develop a methodology to help decision makers to generate sustainable land use management strategies. This study had used Systems Thinking and the concept of environmental carrying capacity to identify the sustainable water and land use management, and define the dynamic relationship between the management system and the environmental interactions. The concepts of driving force-state-response (DSR) model had been applied to establish the decision making theory for sustainable land use management. Based on the proposed decision making theory, this research had adopted the water balancing and D-S-R model, with software of ArcGIS and Matlab, to develop a prototype of decision support system for sustainable land use management. The Tao-Chen river basin was used as a case study to illustrate the capability of the decision support system. The case study had indicated that the interactions and results from the land use decisions can be effectively identified by the proposed model. Through the D-S-R model, the decision makers can obtain the iterative results from possible interactions when planning land use alternatives. The methodology and decision support model developed in this study is useful to help decision makers in sustainable land use management and water resources allocation.