台灣含水層儲蓄回抽優選

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摘要

台灣由於長年缺乏妥善規劃及經營地下水資源，過度使用地下水引發地層下陷等許多環境問題。含水層儲蓄回抽（aquifer storage and recovery，簡稱 ASR）在台灣等潮濕的區域尚未完全開發。其原理是將多餘的地表水注入到地下含水層中，於需要時回抽使用的技術，含水層儲蓄回抽是針對地下水短缺的解決方案，台灣目前正在以驚人的速度消耗含水層的地下水，在低海拔與平坦的環境中進行地表蓄水不可行，因此含水層儲存回抽可以提供一種替代方法來減輕地下水壓力並防止地層下陷和鹽水入侵。本研究的目的是應用人工神經網路的方法評估含水層儲存回抽在台灣的可行性。首先輸入位置的座標，並增加與每口觀測井之間的直線距離，增加與每口觀測井之間的濃度數值，增加與每口觀測井之間的濃度及距離的比值作為人工神經網路的輸入參數，將取對數後的濃度數值作為輸出結果，並使用交叉驗證確認最佳的模式效能並繪製分佈圖，查看含水層儲蓄回抽可行區域。研究結果為可行之含水層儲蓄回抽選址依據，可提供政府及相關單位參考使用。

關鍵字： 含水層儲蓄回抽、人工神經網絡

Aquifer storage and recovery site selection in Taiwan

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Abstract

Due to a lack of proper planning and management of groundwater resources over the years, Taiwan has experienced many environmental issues, such as land subsidence, due to excessive groundwater extraction. Aquifer storage and recovery (ASR), a technique where surplus surface water is injected into underground aquifers for later retrieval, has not been fully developed in Taiwan and other humid regions. ASR is considered a solution for addressing groundwater shortages. Currently, Taiwan is depleting its groundwater resources at an alarming rate, making surface water storage in low-lying and flat areas impractical. Therefore, ASR can provide an alternative method to alleviate groundwater pressure and prevent land subsidence and saltwater intrusion.The purpose of this study is to assess the feasibility of ASR in Taiwan using artificial neural networks. The approach involves inputting the coordinates of the location, adding the straight-line distance between each monitoring well, adding the concentration values between each monitoring well, and adding the ratio of concentration to distance between each monitoring well as input parameters for the neural network. The logarithm of the concentration values is used as the output result, and cross-validation is employed to confirm the best model performance and generate distribution maps to visualize feasible ASR areas.The research findings provide a basis for selecting suitable locations for ASR and can serve as a reference for the government and relevant agencies.

Keywords: Aquifer storage and recovery (ASR),Artificial neural networks (ANN)