探討雲林地區地下水使用之自然、社會與經濟驅動因子複雜交互作用

Investigating the Complex Interplay of Natural and Socio-economic forces driving groundwater use in Yunlin

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摘　要

台灣地下水管理如同許多已開發國家，已制定相關法規制度來控制地下水使用，如鑿井許可、地下水權申請與核發等，並由地方政府負責受理申請與管理。然而，台灣的農業地下水使用受多重因素影響，如地表水水量與水質、供需水時間是否一致、農民所種植作物等，部分因素與農糧政策息息相關。僅依靠法律規範並無法有效達到管理目標與控制地下水抽用。因此，過度使用地下水為台灣許多區域包含雲林地區面臨的問題，而不當的使用也導致地下水水位下降和地層下陷等問題。

為了了解台灣目前地下水管理的挑戰，本研究於雲林地區進行多次權益關係人(stakeholders)訪談。本研究首先辨識與地下水管理密切相關的權益關係人，其中包含：水利署、農水署、農糧署等中央單位、地方政府相關局處、農漁業地下水使用者等，再各別與這些權益關係人進行至少一次訪談，其目的為收集來自不同背景的權益關係人對目前地下水管理挑戰的看法與認知，希望進而建構現有管理挑戰的全貌。

本研究藉由權益關係人辨識，建構出地下水權益關係人關聯圖，用以說明不同權益關係人在地下水管理中的角色和影響。並透過一系列訪談所獲得資訊，建構了雲林地區地下水管理議題因果結構圖，用以描述地下水管理相關關鍵議題和議題之間因果關聯。在該因果圖中，影響地下水管理的三個主要核心面向有水資源管理、農業和農糧政策及國土規劃，每一面向下有多個管理議題與其負責單位，也辨識出一些不同單位間的政策衝突。透過因果圖分析，本研究突顯出不同單位在地下水管理面臨的挑戰和政策衝突，藉由構建管理議題因果結構圖，提供地下水管理相關單位理解彼此角色並進行對話的機會，促進共同探索解決目前地下水管理困境的解決方案。

關鍵詞：權益關係人參與，地下水管理，農糧政策

Abstract

Groundwater management in Taiwan, as in many developed countries, has established sophisticated regulations for controlling groundwater extraction, such as issuing drilling licenses and allocating groundwater extraction permits and water rights, managed by local governments at the county level. However, agricultural groundwater use in Taiwan is affected by many factors such as surface water quantity and quality, timing of water supply, crops cultivated, and some of those factors are affected by agriculture and food policies. Relying on regulations solely cannot effectively and properly manage the resource. Consequently, improper groundwater extraction exists in many areas of Taiwan, including Yunlin, leading to problems such as groundwater depletion and land subsidence.

To understand the challenges to groundwater management in Taiwan, this study conducted stakeholder interviews in Yunlin, Taiwan. Groundwater-related stakeholders were identified first, and interviews were then conducted with stakeholders individually. The aim was to gather insights from stakeholders with different backgrounds regarding the current challenges in groundwater management, and thus, to portray a comprehensive picture of the existing challenges. Stakeholders included staffs from central government agencies responsible for groundwater research, local government departments involved in groundwater management, and groundwater users from agriculture and aquaculture.

As the stakeholders identified, the map of stakeholders was used to illustrate the roles and influences of stakeholders on groundwater management. A causal diagram of key factors related to groundwater management was depicted in the conceptual systematic representation, using information collected from interviews. In the diagram, three main core aspects affecting groundwater management were shown, including water resources management, agriculture and food policies and national land use planning, each of which has its main responsible authorities in Taiwan. Some policy conflicts among different agencies were identified as well. Through the analysis of causal diagrams, the study aimed to highlight the challenges and policy conflicts faced by different authorities in various issues related to groundwater management. Constructing such causal diagrams provides an opportunity for different authorities involved in groundwater management to understand each other's roles and engage in dialogue, facilitating collaborative exploration of appropriate solutions to current groundwater management issues.

Keywords: Stakeholder involvement, Groundwater management, Agriculture policy