韌性防災導向之農田滯洪空間探討-以雲林地區為例

Resilience-Oriented Assessment of Farmland Flood Storage Spaces: A Case Study of Yunlin, Taiwan

經濟部水利署水利規劃分署		中興工程顧問股份有限公司	
工程員	副研究員	工程師	工程師
楊晁晟	李家彰	林暘壹	闕亦吟
Chao-Cheng Yang	Chia-Cheng Lee	Yang-I Lin	Yi-Yin Chueh

摘要

面對極端氣候帶來的頻繁洪水風險，建立具備調適能力的韌性防災體系已成為當前水利規劃的重要課題。其中，滯洪空間的有效配置與潛力評估，是提升區域防洪能力的關鍵步驟。傳統滯洪設施建置往往需要大規模開挖建設與高額經費負擔，且在土地取得上具有諸多限制，因此考量農田具有蓄積雨水降低逕流功能，運用作為彈性滯洪空間的新策略。透過農田放水工操作於豪雨或颱洪期間，能暫時將農田作為蓄洪設施，有效削減洪峰與減緩下游洪災風險；待水退後，農地可恢復耕作，兼顧防災與生產雙重功能，展現土地韌性利用的潛力。

為評估農田作為滯洪空間的適宜性，本研究建構一套綜合評估機制，納入作物耐淹性、是否定期休耕、鄰近地區的淹水潛勢、蓄洪需求等評估子因，以及土地未來使用計畫等指標，透過地理資訊系統(GIS)與專家學者問卷搭配層級分析法(AHP)進行空間分析與分類排序，挑選特定地區之農田在地勢、水文與土地利用條件上，具備高度潛力納入滯洪空間規劃。此外，研究亦考量區域主要農作物，如水稻、玉米與甘蔗等之耐淹期與汛期重疊情形，探討其在不同生育階段受淹水影響之差異性，作為農地選址與減災規劃之依據。

透過篩選機制，在雲林地區盤點 9 處具優先推動潛勢區域，為評估農田滯洪效益，透過淹水模擬分析驗證，挑選四湖大排集水區進行評估，潛在農田可提供約 80 萬立方公尺的滯洪容量，平均滯洪深度達 0.60 公尺，具減少下游聚落如蔡厝與蘇水尾的淹水效果。

關鍵字：韌性防災、農田滯洪、區位篩選、農作物耐淹性、淹水模擬分析

Abstract

In response to the increasing flood risks caused by extreme climate events, establishing adaptive and resilient disaster prevention systems has become a critical issue in current water resources planning. Among various strategies, the effective allocation and potential assessment of flood storage spaces are key steps in enhancing

regional flood mitigation capacity. However, traditional flood detention facilities often require large-scale excavation, high construction costs, and face significant challenges in land acquisition. Therefore, utilizing farmlands as flexible flood storage spaces has emerged as a novel strategy, given their ability to temporarily store rainwater and reduce surface runoff. By operating drainage gates during heavy rainfall or typhoon events, farmlands can be temporarily used as flood detention areas to effectively reduce peak flows and mitigate downstream flood risks. Once floodwaters recede, farmlands can resume agricultural production, demonstrating the dual functionality of disaster mitigation and agricultural use, and showcasing the potential for resilient land utilization.

To evaluate the suitability of farmlands as flood storage spaces, this study establishes a comprehensive assessment framework that incorporates sub-criteria such as crop flood tolerance, fallow status, flood potential of adjacent areas, and flood storage demands, as well as future land use plans. Using Geographic Information System (GIS) analysis combined with expert questionnaires and the Analytic Hierarchy Process (AHP), spatial analysis and classification were conducted to identify farmlands with high potential for inclusion in flood storage planning based on topography, hydrology, and land use conditions. Furthermore, the study considers major regional crops, including rice, corn, and sugarcane, to analyze the overlap between their flood tolerance periods and flood seasons, as well as the impacts of flooding during different crop growth stages, providing a scientific basis for farmland site selection and disaster mitigation planning.

Through the screening mechanism, nine priority areas with high potential for implementation were identified in the Yunlin region. To further evaluate the flood storage benefits of farmlands, a flood simulation analysis was conducted using the Shuihu Drainage Basin as a case study. The results indicate that the potential farmlands can provide approximately 800,000 cubic meters of flood storage capacity, with an average detention depth of 0.60 meters, effectively reducing flood risks in downstream communities such as Caicuo and Suishuiwei.

Keywords: Disaster Resilience, Farmland Flood Storage, Site Selection, Crop Flood Tolerance, Flood Simulation Analysis