

整合水文自動測報及灌溉資訊回饋機制之研究 -以臺東關山圳為例

A Study on the Integration of Automated Hydrological Monitoring and Irrigation Information Feedback Mechanisms: A Case Study of the Guanshan Canal in Taitung, Taiwan

台灣水資源與農業研究院

研究專員

楊舜年

Shun-Nien Yang

農業部農田水利署

組長

朱志彬

Chih-Bin Chu

正工程司

郭芳慈

Fang-Tzu Kuo

摘要

臺灣農田水利灌溉區域可分為「水庫型灌區」與「河川型灌區」，水庫型灌區主要透過水庫調控灌溉用水，如石門水庫、明德水庫、鯉魚潭水庫、曾文-烏山頭水庫等；河川型灌區則透過河川上之攔河堰取水，無水庫等儲蓄設施進行水量調配。而當期作供灌前，各管理處則依據計畫種植面積編訂灌溉計畫，明確訂定各圳路、各甸之甸用水量；若為水庫型灌區，可透過初始蓄水量、入流量超越機率、民生公共用水量與灌溉計畫用水量，模擬水庫蓄水量歷程，評估供灌結束後之水庫蓄水量，確保水庫供水安全。然，河川型灌區無法採用蓄水量模擬之方式，需透夠過即時雨量及渠道流量資料與相關預警機制進行供灌操作。

於各地灌區設置 CCTV 或流量自動監測站等設備，常受限於網路、市電及維運費用等原因，難以全面增設，故本研究於臺東關山圳下游灌區（後單期田），未設置 CCTV 或流量自動監測處，提出整合氣象署雨量站資料、流量自動測報、變動尺度 SPI 值、歷年實際種植面積等資訊，同時引入 LINE 機器人回報之機制，邀請關山圳下游灌區水利小組長協助，配合關山圳通水時期，至下游各支線取水口及關山圳末端（關山圳 13、15、16、17 支線取水口及 17 支線末端）進行回報，若渠道內流量不足以供灌該支線，則以 LINE 機器人回報點位，關山工作站人員即可即時確認各支線缺水點位，以利工作站掌握各項重要資訊，滾動式調整配水策略。

關鍵詞：河川型灌區，LINE BOT，供灌配水策略

Abstract

Irrigation areas in Taiwan can be classified into "Reservoir-type irrigation areas" and "River-type irrigation areas." Reservoir-type irrigation areas rely primarily on reservoirs for irrigation water regulation, such as Shimen, Mingde, Liyutan, and Zengwen–Wusantou reservoirs. In contrast, river-type irrigation areas draw water directly from rivers using weirs, without reservoir-based storage and regulation facilities. Prior to each irrigation period, local irrigation management offices formulate irrigation plans based on the planned cropping area, specifying the water allocation for each canal and each ten-day period. For reservoir-type areas, initial reservoir storage, inflow probability, public water demand, and irrigation water demand can be used to simulate reservoir storage dynamics, thereby ensuring water supply security. However, river-type irrigation areas lack storage capacity and therefore cannot apply such simulations. Instead, they rely on real-time rainfall data, channel flow data, and warning mechanisms to manage water delivery.

The installation of CCTV systems or automatic flow monitoring stations in irrigation districts is often constrained by limitations such as internet connectivity, electricity supply, and maintenance costs, making comprehensive deployment difficult. Consequently, in the downstream irrigation area of the Guanshan Canal in Taitung, where neither CCTV nor automatic flow monitoring facilities are installed, this study proposes an integrated approach that combines rainfall data from the Central Weather Administration, automatic flow monitoring data, variable-scale Standardized Precipitation Index (SPI) values, and historical records of actual cultivated areas. In addition, a LINE chatbot-based reporting mechanism is introduced, with the participation of local irrigation group leaders from the downstream area. During the canal water distribution periods, these leaders provide field reports at the intake points of downstream branch canals and the canal terminus (specifically, the intake points of branches 13, 15, 16, and 17, as well as the terminus of branch 17). When the canal flow is insufficient to meet the irrigation demand of a given branch, the shortage is reported via the LINE chatbot. This enables the Guanshan workstation personnel to immediately identify water-deficient locations, thereby facilitating timely access to critical information and supporting dynamic adjustments of water allocation strategies.

Keywords: River-type irrigation area, LINE Bot, Irrigation water distribution strategy