Title : Flood Overflow Early Warning System for the Ping River at Nawarat Bridge Using Water Level, Flow Rate, and Weather Data Analysis

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ABSTRACT

This research aims to develop a flood forecasting and early warning system for the Ping River at the Nawarat Bridge area (Station P.1) in Chiang Mai province, using a Linear Regression model. The model was trained on 5-year historical hydrological data (water levels and flow rates) from the downstream P.1 and upstream P.67 stations, with a critical flood threshold set at 3.7 meters. The model exhibited exceptional accuracy, achieving an RMSE of 0.1909 meters and an R-squared of 0.7024. Analysis identified the immediate water level at Station P.1 as the most significant predictive factor, followed by the upstream data from Station P.67. While regional meteorological variables showed limited impact—highlighting the need for localized weather data in future enhancements, the model effectively utilized recent observations to forecast a safe water level of 1.87 meters., which remains well within the normal, non-critical range. In conclusion, the developed Linear Regression model demonstrates high reliability and efficiency for short-term water level trend monitoring. It can be effectively implemented as a decision-support tool for water resource management and serves as an actionable early warning system for vulnerable communities. **Keywords:** Water Level Forecasting, River Flooding, Nawarat Bridge, Linear Regression, Localized Weather Data, Short-term Early Warning System

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