

EGU21-5753

<https://doi.org/10.5194/egusphere-egu21-5753>

EGU General Assembly 2021

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Integrating drought indices and long-term weather forecasts with a dynamic Bayesian network for assessing water shortage risk – a case study in Taoyuan

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Water scarcity, which is a critical issue worldwide, is exacerbated by geomorphic characteristics and highly uneven spatiotemporal distribution of rainfall in Taiwan. The annual water availability per capita in Taiwan is less than one-fifth of the world average despite the high annual rainfall. Hence, stable water supply and efficient water resources management are challenging tasks for related authorities, and a decision support tool is required for the optimal decision. This study proposes a risk assessment framework for water shortage based upon a dynamic Bayesian network. Standardized precipitation index (SPI), standardized runoff index (SRI) and long-term weather forecasts are included in the framework. Taoyuan, a northern city in Taiwan with rapid growth of population and industries, is particularly vulnerable to water shortage and thereby chosen as our study site.