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Impact of climate change on water resources over a basin scale in northern Taiwan

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Since the precipitation patterns probably change due to climate change, and the water demand surely increases in future, water resource management will be under a higher risk than nowadays. The study of impacts of climate change on water resources is urgent and important. The aim of this study is to develop a user-friendly system to assess the water Shortage Indexes (SI) of Shihmen reservoir in northern Taiwan under different climate change scenarios and periods. This system is consisted with three parts, first is the weather generating model for determining daily temperatures and precipitation from monthly GCMs outputs. Second part is a concept hydrological model utilizing to project the hydrological variables under the scenarios from first part. Third is the reservoir water Supply-Demand system which is used to determine the ten-days and average yearly water shortage rate. The delta change of monthly temperature and precipitation from the grid cell of GCMs (General Circulation Models) that is closest to the study area, were utilized to generate the daily rainfall and temperature series based on a weather generation model. The daily rainfall and temperature series were further inputted into the calibrated hydrological model to project the hydrological variables. The studies show that rainfall and discharge will be increased during the wet season (May to October) and decreased during the dry season (November to April of the following year). Evapotranspiration will be increased in the whole year except in November and December. Finally, the system reveals the future SI of Shihmen reservoir is smaller than exiting condition, however the SI increase by time. The water resource management plan should also adapt for future climate and increased water demand.