



## **The identification of sustainable yield for hot spring regarding water level and temperature**

Kai-Yuan Ke (1) and Yih-Chi Tan (2)

(1) Center for Weather Climate and Disaster Research, National Taiwan University, Taipei, Taiwan (kent0115@gmail.com),

(2) Department of Bioenvironmental System Engineering, National Taiwan University, Taipei, Taiwan (yctan@ntu.edu.tw)

In order to sustainably manage and utilize the limited hot spring resource, the cool-hot water exchange model is established by combination of Soil and Water Assessment Tool (SWAT) and SHEMAT. Hot spring in Ziaoxi, Taiwan, is chosen as study area. With data of geography, weather, land use and soil texture, SWAT can simulate precipitation induced infiltration and recharge for SHEMAT. Then SHEMAT is calibrated and verified with in-situ observation data of hot spring temperature and water level. The relation among precipitation, pumping, change of water temperature and water level is thus investigated. The effect of point well pumping, which dramatically lower the water level and temperature, due to prosperous development of hot spring building and industry is also considered for better model calibration. In addition, by employing a modified Hill's method, the sustainable yield is identified. Unlike traditional Hill's method, the modified Hill's method could account for not only the change of water level but also the temperature. As a result, the estimated sustainable yield provide a reasonable availability of hot spring resources without further decline of the water level and temperature.