

## Estimating Daily Evaporation from Poorly – Monitored Lakes using limited Meteorological Data

Open water evaporation is influenced by several meteorological parameters such as: irradiance, soil temperature, relative humidity, atmospheric pressure, and wind speed. However, dealing with that matter, in a case of measurements scarcity, is a challenging task. To overcome this problem, the authors sought a less-dimensional method to estimate lake evaporation. This technique takes into account only three weather variables: Temperature, Relative Humidity and Dew point. In fact, the approach is summarized as follows: 1- using Levenberg-Marquardt algorithm, a Nonlinear Regression Model based on Magnus formula is trained and tested to estimate the dew point. 2- a simplified Penman formula provides an estimate of the lake evaporation rate. To test approach effectiveness, the suggested method was applied on Qaraoun Lake – Lebanon. Upon testing, the regression model exhibited high accuracy with a goodness of fit value equal to 0.99. Afterward, the evaporation rates were estimated using Penman formula. Unfortunately, evaporation measurements are not available on site to carry the testing procedures. Instead, outcomes were compared with the monthly evaporation average retrieved from the nearest region to the lake. Estimated rates were reasonably good with a correlation coefficient equal to 0.8. Overall, achieved results were reliable enough to carry out a further assessment of the economic impact of evaporation losses from Qaraoun reservoir on hydropower generation.