# Climate change impact on rainfall and temperature in Muda irrigation area using multicorrelation matrix and downscaling method

*Nurul Nadrah Aqilah Tukimat*[a], *Sobri Harun*[b]

[a] Department of Water Resources and Environmental, Universiti Malaysia Pahang, Gambang, Pahang, Malaysia

[b] Department of Hydraulic and Hydrology, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia

**ABSTRACT**

Statistical downscaling model was used to generate 30-year climate trend of Kedah - the state which has the largest cultivation area in Malaysia, resulting from climate changes. To obtain a better predictors set, multicorrelation matrix analysis was added in the climate model as a screening tool to explain the multiple correlation relationship among 26 predictors and 20 predictands. The performance of the predictor set was evaluated statistically in terms of mean absolute error, mean square error, and standard deviation. The simulation results depict the climatic changing trend in this region in terms of temperature, rainfall, and wet and dry length compared to historical data captured from 1961 to 2008. Annual temperature and rainfall depth are expected to increase 0.2 °C per decade and 0.9% per year, respectively, from the historical record. The months of November and January are expected to receive the highest and lowest rainfall depth, respectively, because of the two monsoon seasons. The wet spell is estimated to be from May to November in the middle of Kedah. The annual dry spell shall be from January to March, and is expected to shorten yearly.

**KEYWORDS**

Climate projection; Multiple correlation; Rainfall; Statistical downscaling; Temperature

**REFERENCES**

1. Bates, B., Kundzewicz, Z.W., Wu, S., Palutikof, J.
(2008) *Climate Change and Water*.
IPCC Technical Paper VI, IPCC, Geneva, Switzerland

2. Cheang, B.K., Tan, H.V., Yong, P.W.
Some Aspects of Wet and Dry Spells in Malaysia, 1951-1983. Part II: Synoptic condition responsible for the wet and dry spell (1986)
*Malaysian Meteorological Department, Research Publication*, 15, pp. 1-10.

3. Crane, R.G., Hewitson, B.C.
Doubled $CO_2$ precipitation changes for the Susquehanna basin: Down-scaling from the GENESIS general circulation model
(1998) International Journal of Climatology, 18 (1), pp. 65-76.

4. Rainfall-runoff analysis
(1991) *A Manual for the Design and Construction of Water Harvesting Schemes for Plant Production*, pp. 1-50.
FAO, W. Critchley & K. Siegert, eds, Rome

5. Goodess, C.M., Palutikof, J.P.
Development of daily rainfall scenarios for southeast Spain using a circulation-type approach to downscaling
(1998) *International Journal of Climatology*, 18 (10), pp. 1051-1083.