

RINGKASAN

Ersty Nurul Frida Asmara, Jurusan Teknik Pengairan, Fakultas Teknik Universitas Brawijaya, Januari 2017, *Analisa Metode Perhitungan Evaporasi Potensial di Karangploso, Kabupaten Malang, Jawa Timur*, Dosen Pembimbing: Ery Suhartanto dan Donny Harisuseno.

Pendekatan perhitungan evapotranspirasi, baik potensial maupun aktual sangat bervariasi, baik yang sering digunakan maupun yang jarang sekali digunakan. Pada umumnya, metode-metode yang digunakan untuk menaksir besarnya evapotranspirasi didasarkan pada anggapan bahwa air tersedia secara berlebihan, sehingga yang didapat adalah nilai evaporasi potensial. Dengan bervariasinya metode-metode perhitungan untuk mengetahui besarnya evaporasi potensial, maka akan bervariasi pula nilai evaporasi potensial yang didapat. Oleh karena itu, perlu adanya suatu analisa agar dari bervariasinya metode tersebut, didapat satu metode yang terbaik yang sesuai dengan kondisi iklim dari suatu lokasi tertentu, dimana nantinya akan mempermudah dalam penggunaan metode untuk mengetahui besarnya evaporasi potensial sesuai kondisi iklimnya.

Studi ini dilakukan di Stasiun Klimatologi Klas II Karangploso, Kabupaten Malang dengan data iklim (suhu udara, kelembaban udara, lama penyinaran matahari, dan kecepatan angin) dan data evaporasi hasil pengamatan selama 10 tahun, mulai tahun 2004 sampai dengan 2013. Metode yang digunakan untuk mengetahui besarnya evaporasi potensial, antara lain Metode Blaney-Criddle, Metode Radiasi, Metode Penman Modifikasi FAO, Metode Penman-Monteith, Metode Thornthwaite, dan Model Regresi Linier Berganda. Sedangkan untuk mengetahui kesesuaian metode antara metode-metode diatas terhadap hasil pengamatan menggunakan Uji Efisiensi Nash-Sutcliffe, Uji Stasioner, *Mean Absolute Error (MAE)*, Koefisien Determinasi, dan Kesalahan Relatif. Berdasarkan hasil analisa kesesuaian metode tersebut akan didapatkan sebuah metode evaporasi potensial terpilih.

Berdasarkan hasil analisa kesesuaian metode, Metode Penman-Monteith merupakan metode evaporasi potensial terpilih. Hal ini didasarkan pada hasil pengujian yang telah memenuhi kriteria-kriteria pengujian, antara lain untuk Uji Efisiensi Nash-Sutcliffe, Metode Penman-Monteith termasuk dalam kriteria sangat baik karena nilai $E_{NS} = 0,755$. Untuk Uji Stasioner, baik Uji-F maupun Uji-t, Metode Penman-Monteith dikatakan stasioner. Untuk nilai *MAE*, Metode Penman-Monteith memiliki nilai paling rendah dibandingkan metode lain, yaitu 0,281. Untuk koefisien determinasi, Metode Penman-Monteith memiliki nilai $R^2 = 0,7981 = 79,81\%$. Dan yang terakhir, untuk nilai K_r , Metode Penman-Monteith memiliki nilai paling baik, yaitu 0,809.

Kata kunci : evaporasi potensial, suhu udara, kelembaban udara, lama penyinaran matahari, uji kesesuaian

SUMMARY

Ersty Nurul Frida Asmara, Department of Water Resources Engineering, Faculty of Engineering, University of Brawijaya, January 2017, Analysis of Potential Evaporation Calculation Method at Karangploso, Malang Regency, East Java, Academic Supervisor: Ery Suhartanto and Donny Harisuseno.

Method to estimate evapotranspiration was varying because it had different operation for potential and actual occurrences. The method also varied in term of frequency of usage, precisely either frequently used or less frequently used. Generally, methods that were used to estimate evapotranspiration rate based on the assumption that the available water was abundant, and therefore, potential evaporation rate could be measured. The variance of methods to estimate potential evaporation rate must lead to the variance of resultant potential evaporation rate. Therefore, a specific analysis must be carried out to select from these variances the best estimation method that was suitable to any climate conditions at certain location. It would facilitate the measurer in using the estimation method that matched with climate condition to find out potential evaporation rate.

The study was conducted at Climatology Station Class II Karangploso, Malang Regency. The data included climate data (temperature, air humidity, sun radiation length, and wind speed) and evaporation data. These data were the result of observation for 10 years started from 2004 to 2013. Some methods were used in this study to estimate potential evaporation rate, such as Blaney-Criddle Method, Radiation Method, FAO Modification Penman Method, Penman-Monteith Method, Thornthwaite Method, and Multiple Linear Regression Method. The compatibility of these methods and the result of observation in this study was estimated by executing several tests or using some measures, such as Nash-Sutcliffe Efficiency Test, Stationary Test, Mean Absolute Error (MAE), Coefficient of Determination, and Relative Error. By taking account the result of analysis on the compability of methods, then the best method to estimate potential evaporation rate could be selected.

As shown in the result of analysis on the compatibility of methods, Penman-Monteith Method was selected as the best method to measure potential evaporation rate. This method had passed various tests for certain criteria. After being subjected to Nash-Sutcliffe Efficiency Test, Penman-Monteith Method was classified into very good criteria by $E_{NS} = 0,755$. In Stationary Test, either with F-test or t-test, Penman-Monteith Method was said as stationary. For MAE, Penman-Monteith Method had the lowest rate, precisely 0,281, of other methods. At Coefficient of Determination, Penman-Monteith Method had $R^2 = 0,7981 = 79,81\%$. Finally, for Relative Error, Penman-Monteith Method had the best rate, precisely 0,809.

Keywords: potential evaporation, temperature, air humidity, sun radiation length, compatibility test