ANALISIS POTENSI HASIL AIR DI DAERAH TANGKAPAN AIR DANAU
RAWA PENING MENGGUNAKAN MODEL INTEGRATED VALUATION
OF ECOSYSTEM SERVICES AND TRADEOFFS

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INTISARI

Daerah Tangkapan Air Danau Rawa Pening merupakan hulu DAS Tuntang, salah satu DAS prioritas di Indonesia. Salah satu indikator kesehatan suatu DTA adalah hasil air. Kuantitas dan kontinuitas air yang terjamin di suatu DAS adalah unsur yang sangat penting dalam membangun ketahanan air. Hasil air dapat dimodelkan dengan model InVEST. Penelitian ini bertujuan untuk: (1) mengaplikasikan model InVEST untuk mengestimasi besar potensi hasil air secara temporal di Daerah Tangkapan Air Danau Rawa Pening tahun 2018-2022, (2) mengetahui ketelitian model InVEST dalam mengestimasi hasil air secara temporal di Daerah Tangkapan Air Danau Rawa Pening, serta (3) mengetahui distribusi spasial dan karakteristik hasil air di Daerah Tangkapan Air Danau Rawa Pening tahun 2018-2022.

Pemodelan hasil air menggunakan model InVEST dilakukan secara spasial-temporal. Data yang dihimpun merupakan data tahun 2018-2022. Data masukan model InVEST, yakni data curah hujan, temperatur, koefisien tanaman, bilangan kurva, kelas hidrologi tanah, penggunaan lahan, data debit terukur pos duga air, dan data *digital elevation model* (DEM). Data temperatur diubah menjadi data evapotranspirasi acuan bulanan. Hasil pemodelan ini dilakukan proses kalibrasi dan verifikasi agar mendapatkan nilai sesuai dengan tujuan model.

Hasil pemodelan secara temporal menunjukkan pola yang hampir sama setiap tahunnya. Selain itu, hasil pemodelan juga memiliki pola yang sama dengan curah hujan. Puncak *direct runoff* adalah setiap awal dan akhir tahun. *Direct runoff* terbesar selama periode 2018-2022 terjadi pada bulan November 2022, yakni sebesar 645,87 mm/bulan, sedangkan yang terendah adalah bulan Juli 2018, yakni sebesar 0,08 mm/bulan. Hasil validasi model menunjukkan nilai koefisien korelasi, indeks PMARE, dan koefisien determinasi secara berturut-turut sebesar 0,95, 12,84%, dan 0,90. Hasil ketelitian model InVEST tergolong cukup kuat karena adanya keterikatan antar variabel, meskipun tetap terdapat penyimpangan terhadap hasil pemodelan. Distribusi spasial *direct runoff* dipengaruhi oleh curah hujan, penggunaan lahan, kelas hidrologi tanah, dan *threshold flow accumulation*.

Kata kunci: Daerah Tangkapan Air Danau Rawa Pening, hasil air, model InVEST, temporal, distribusi spasial

ANALYSIS OF WATER YIELD POTENTIAL IN THE RAWA PENING
CATCHMENT AREA USING INTEGRATED VALUATION OF ECOSYSTEM
SERVICES AND TRADEOFFS MODEL

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ABSTRACT

Rawa Pening Catchment Area is the upstream of the Tuntang Watershed, one of the priority watersheds in Indonesia. One indicator of the health of a catchment area is water yield. Guaranteed quantity and continuity of water in a watershed is a very important element in building water security. Water yield can be modeled with the InVEST model. This study aims to: (1) apply the InVEST model to estimate the temporal water yield potential in the Rawa Pening Catchment Area in 2018-2022, (2) measure the accuracy of the InVEST model in estimating water yields temporally in Rawa Catchment Area and (3) understand the spatial distribution and characteristics of water yield in Rawa Pening Catchment Area in 2018-2022.

Water yield modeling using the InVEST model is carried out spatially and temporally. The data collected is data for 2018-2022. Input data for the InVEST model are rainfall data, temperature, crop coefficient, curve number, soil hydrologic group, land use, measured discharge data and data digital elevation model (DEM). Temperature data is measured into monthly reference evapotranspiration. The results of this modeling are carried out by a calibration process in order to obtain values according to the model objectives.

The modeling results temporally show almost the same pattern every year. In addition, the modeling results also have the same pattern as rainfall. Peak of direct runoff is every at the beginning and the end of the year. Direct runoff values show the largest during the 2018-2022 period occurred in November 2022, which is 645,87 mm/month, while the lowest is in July 2018, which is 0.08 mm/month. The results of the model validation show that the correlation coefficient, PMARE index, and determination coefficient are 0.95, 12,84%, and 0.90, respectively. The results of the accuracy of the InVEST model are quite strong due to the strong association between variables, although there are deviations from the modeling results. Spatial distribution of direct runoff is influenced by rainfall, land use, soil hydrology group and threshold flow accumulation.

Keywords: Rawa Pening Catchment Area, water yield, InVEST model, temporally, spatial distribution