

## **Perubahan Keseimbangan Air di Hutan Hujan Tropis**

### **dengan Sistem Pengelolaan Hutan Intensif**

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### **Abstrak**

*Pemahaman tentang perubahan keseimbangan air di areal berhutan berperan penting dalam pengelolaan sumber daya air secara berkelanjutan dan mengantisipasi potensi gangguan yang*

*disebabkan oleh implementasi suatu sistem pengelolaan hutan. Studi ini dilaksanakan di kawasan hutan hujan tropis alam di Propinsi Kalimantan Tengah Indonesia.*

*Tujuan studi ini adalah untuk menentukan perubahan keseimbangan air di dalam hutan hujan tropis alam yang dikelola dengan Sistem Pengelolaan Hutan Intensif menggunakan model Thornthwaite Mather Water Balance (TMWB). Model TMWB menghitung keseimbangan air berdasarkan rata-rata presipitasi bulanan dalam jangka panjang, potensi evapotranspirasi dan kombinasi latitude, sifat-sifat tanah dan karakteristik vegetasi*

*Hasil studi menunjukkan adanya kesesuaian antara streamflows yang diprediksi dan diobservasi di hutan alam (natural forest) maupun hutan yang telah diperlakukan (treated forest). Di areal hutan alam koefisien run off adalah 0,5. Hal tersebut diasumsikan bahwa 50% kelebihan air sebenarnya tersedia berupa streamflow di setiap bulan dan sisanya menjadi air tertahan yang mensuplai kelembaban tanah dan air permukaan. Koefisien run off tersebut juga diasumsikan bahwa 50% air yang tertahan tersedia dalam bentuk streamflow pada bulan selanjutnya. 1 tahun setelah perlakuan Sistem Pengelolaan Hutan Intensif, koefisien run off meningkat menjadi 0,6. Pengurangan penutupan tajuk di areal hutan yang telah diperlakukan (treated forest) menurunkan evapotranspirasi tahunan mendekati 45,3%, sementara run off tahunan meningkat mendekati 33,7% dari hutan alam.*

*Secara keseluruhan, hasil perhitungan menggunakan metode TMWB mengindikasikan bahwa status keseimbangan air dan run off tidak mengalami masalah yang mengarah pada kondisi defisit air di hutan tropis alam. Hasil studi tersebut menjelaskan bahwa di kawasan berhutan, terjadi hubungan yang erat antara curah hujan, evapotranspirasi dan produksi run off. Gangguan-gangguan terhadap permukaan lahan, perubahan penggunaan lahan dan penurunan potensi penutupan tajuk berpengaruh khususnya pada keseimbangan air. Gangguan-gangguan tersebut mempengaruhi evapotranspirasi dan proses infiltrasi yaitu menurunkan evapotranspirasi dan meningkatkan run off.*

## Perubahan Keseimbangan Air di Hutan Hujan Tropis dengan Sistem Pengelolaan Hutan Intensif

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**Kata-kata kunci:** *hutan tropis; keseimbangan air; evapotranspiration; runoff; penutupan tajuk; gangguan permukaan lahan* .

**Water balance changes in the tropical rainforest with intensive forest management system**

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**Abstract**

Understanding the water balance changes in the forested area is important for managing the sustainability of water resources and anticipating potential disturbance caused by the implementation of a particular forest management system. This study was conducted in a natural tropical rainforest of Central Kalimantan, Indonesia.

The objective of this study is to determine the water balance changes in the tropical rainforest under Intensive Forest Management System (IFMS) using a Thornthwaite Mather Water Balance (TMWB) model. The TMWB model calculates the water balance based on long-term average monthly precipitation, potential evapotranspiration, and combined latitudes, soil properties, and vegetation characteristics.

The results found a good agreement between the predicted and observed monthly streamflows both in the natural forest and treated forest. In the natural forest found the runoff coefficient is 0.5. It is assumed that 50% of the surplus water is actually available as streamflow in any given month, and the rest become detention water to supply soil moisture and ground water. It is also assumed that 50% of detention water is available as streamflow in the next month. 1-year after IFMS treatment, the runoff coefficient increased to 0.6. Canopy cover reduction in the treated forest has reduced the annual evapotranspiration approximately in 45.3%, while the annual runoff has increased approximately in 33.7% from natural forest.

The overall results of calculations using the TMWB method indicated that the water balance statue and runoff are not experiencing the problems leading to water deficit under natural tropical forest conditions. These results suggest that in the forested area, a strong relationship exists among rainfall, evapotranspiration, and runoff production. Surface disturbances, land-use changes, and reductions in canopy cover potentially impact the water balance - in particular, they influence evapotranspiration and infiltration processes that reduce evapotranspiration and increase runoff.

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**Keywords:** *tropical forest; water balance; evapotranspiration; runoff; canopy cover; surface disturbance*

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