INTISARI

Pembangunan Bendungan Karangnongko di Sungai Bengawan Solo direncanakan dapat membantu memberikan suplai air irigasi dan air baku untuk wilayah Bojonegoro dan Blora serta mereduksi banjir di hilir bendungan. Mengingat Bendungan Karangnongko yang saat ini masih berada di dalam tahap pembangunan, maka perlu disusun pedoman operasi dalam bentuk *rule curve* agar pemanfaatan air mencapai hasil yang optimal.

Debit *inflow* bendungan diperkirakan dengan berdasar pada data debit terukur di Pos Duga Air Napel yang terletak di hulu daerah genangan bendungan. Koreksi data debit di Pos Duga Air Napel dilakukan dengan bantuan model alihragam hujan-aliran metode Mock. Kebutuhan air irigasi dihitung dengan menyesuaikan pola tanam dan standar satuan kebutuhan air irigasi, sementara optimasi pelepasan air bendungan dilakukan menggunakan fitur *Solver Microsoft Excel* dengan mengacu pada persamaan neraca air waduk dan aturan baku pengaturan air waduk metode *Standard Operating Rule*.

Hasil penelitian menunjukkan bahwa pemanfaatan air belum maksimal karena jumlah kebutuhan air tahunan masih lebih kecil dibandingkan potensi ketersediaan air tahunan. Terdapat potensi debit inflow tahunan yang sangat besar (4710,05 MCM) dibandingkan kebutuhan operasional awal (761,22 MCM), mengindikasikan terdapat potensi peningkatan pemanfaatan. Namun, realisasi peningkatan ini terbatasi akibat distribusi debit tahunan yang tidak merata dan pola operasi bendung gerak yang dominan sebagai pengendali banjir. Implikasi dari penelitian ini menunjukkan bahwa meskipun Bendungan Karangnongko memiliki potensi besar untuk memenuhi kebutuhan air, fungsi utamanya sebagai sistem pengendali banjir membatasi pemanfaatan penuh debit *inflow* untuk tujuan irigasi dan air baku.

Kata kunci: Bendungan Karangnongko, optimasi, *rule curve*, kebutuhan air irigasi, air baku

ABSTRACT

The construction of the Karangnongko Dam on the Bengawan Solo River is planned to support the supply of irrigation and raw water for the Bojonegoro and Blora regions, as well as to reduce flooding downstream of the dam. Considering that the Karangnongko Dam is still under construction, it is necessary to develop an operational guideline in the form of a rule curve to optimize water utilization.

The dam's inflow discharge is estimated based on observed discharge data from the Napel Water Level Station located upstream of the dam's reservoir area. Discharge data from the station are corrected using the Mock rainfall-runoff transformation model. Irrigation water demand is calculated based on cropping patterns and standard irrigation water requirements, while water release optimization is performed using Microsoft Excel's Solver feature, referring to the reservoir water balance equation and the Standard Operating Rule (SOR) method for reservoir operation.

The results indicate that water utilization has not yet been maximized, as the annual water demand remains significantly lower than the potential annual water availability. There is a large potential annual inflow (4710.05 MCM) compared to the initial operational demand (761.22 MCM), indicating room for increased utilization. However, this potential is constrained by the uneven distribution of annual inflows and the dominant operational pattern of the downstream weir, which functions primarily as a flood control structure. The implication of this study is that while the Karangnongko Dam has substantial potential to meet water demand, its primary function as a flood control system limits the full use of inflow discharge for irrigation and raw water purposes.

Keywords: Karangnongko Dam, optimization, rule curve, irrigation water demand, raw water