

ABSTRAK

ANALISIS SISTEM IRIGASI D.I. WAY GEMOL

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D.I. Way Gemol memiliki luasan baku 76 Ha dilayani empat bendung. Dengan pola tanam yang diterapkan Padi - Padi - Bero, rata-rata hanya mencapai IP <126% dengan kombinasi IP MT. I 100% dan MT. II 26% menggunakan sistem pemberian air irigasi secara penggenangan terus-menerus. Analisis sistem irigasi dan sistem pemberian air sudah sering dilakukan, tetapi sangat sedikit penelitian yang menganalisis efektifitas keduanya untuk mencapai IP optimal yang dapat diterapkan di lapangan. Jika luas panen lebih besar, maka kombinasi sistem irigasi dan sistem pemberian air tersebutlah yang lebih tepat diterapkan untuk mencapai IP optimal.

Metode yang digunakan untuk menganalisis debit ketersediaan air (Q80%) adalah F.J. Mock dan NRECA, sedangkan untuk menganalisis debit kebutuhan air irigasi (Qreq) menggunakan metode empiris Penman (NFR empiris) dan pengukuran lapangan (NFR aktual). Strategi sistem pemberian air dianalisis dengan sistem rotasi dan *Alternate Wetting and Drying* (AWD). Hasil analisis debit ketersediaan air pada segmen kritis MT. II hanya tersedia maksimal 49,49 L/det (jauh dibawah Qreq = 199 L/det dengan NFR 1,7 L/det/ha), sehingga luas panen hanya mencapai 19,5 Ha. Untuk analisis sistem pemberian air pada sistem 2 bendung, sistem rotasi didapat luas panen 19 Ha (IP 125%) dan sistem AWD didapat luas panen 57 Ha (IP 175%). Analisis konektivitas didapat dimensi intake dan saluran primer eksisting secara teknis mencukupi, namun penampangnya *over design*, sedangkan untuk penyambungan antar saluran primer Gemol IV sampai saluran primer Gemol II pada sistem 2 bendung telah memenuhi syarat kecepatan aliran minimal. Pemilihan sistem irigasi terefisien dilakukan dengan meninjau 4 aspek, yakni luas layanan, masalah sosial dan biaya operasi-pemeliharaan, sedangkan sistem pemberian air dipilih berdasarkan IP teroptimal. Hasil analisis efisiensi terhadap simulasi tiga sistem irigasi didapat bahwa sistem 2 bendung menjadi sistem irigasi terefisien dan sistem AWD lebih tepat untuk menghasilkan IP teroptimal dengan prosentase efisiensi mencapai 75%.

Kata kunci: debit andalan, debit kebutuhan air irigasi, NFR, musim tanam, AWD

ABSTRACT

IRRIGATION SYSTEM ANALYSIS IN D.I. WAY GEMOL

By

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The Way Gemol Irrigation Area (D.I. Way Gemol) covers a service area of 76 hectares and is supplied by four weirs. With the existing cropping pattern of rice–rice–fallow, the average cropping intensity (CI) is less than 126%, consisting of 100% for the first cropping season (MT I) and only 26% for the second (MT II), under a continuous flooding irrigation system. Although studies on irrigation systems and water delivery methods have been conducted frequently, very few have analyzed the effectiveness of both in achieving an optimal cropping intensity that can be practically implemented in the field. The larger the harvested area, the more appropriate the combination of irrigation system and water delivery method is for achieving the optimal CI.

The water availability discharge ($Q_{80\%}$) was analyzed using the F.J. Mock and NRECA methods, while irrigation water demand (Q_{req}) was analyzed using the empirical Penman method (empirical NFR) and field measurements (actual NFR). Water delivery strategies were analyzed through rotation and Alternate Wetting and Drying (AWD) systems. The analysis results show that during the critical period of MT II, the maximum available discharge is only 49.49 L/s—far below the required discharge ($Q_{req} = 199$ L/s, with $NFR = 1.7$ L/s/ha)—allowing an irrigated area of only 19.5 ha. For the two-weir system analysis, the rotation method yielded 19 ha of irrigated area (CI = 125%), while the AWD system achieved 57 ha (CI = 175%). Connectivity analysis indicates that the existing intake and primary canal dimensions are technically adequate but overdesigned, while the connection between Gemol IV and Gemol II primary canals meets the minimum flow velocity requirements. The selection of the most efficient irrigation system considered four aspects: service area, social issues, operational and maintenance costs; whereas the water delivery system was chosen based on optimal CI. Efficiency analysis through simulation of the three irrigation systems revealed that the two-weir system is the most efficient, and the AWD method is the most suitable for achieving the optimal cropping intensity, with an efficiency level reaching 75%.

Keywords: dependable discharge, irrigation water requirement, NFR, cropping season, AWD.