INTISARI

Sebagai daerah semi-kering, provinsi Nusa Tenggara Timur (NTT) sering mengalami episode kekeringan dan banjir, sehingga diperlukan upaya mitigasi bencana alam tersebut antara lain pembangunan embung dan *off-stream reservoir*. Embung sangat populer di daerah semi-arid Indonesia sejak tahun 1980an. Meski demikian, embung tidak dapat melayani kebutuhan air baku secara optimal karena keterbatasan kapasitas tampung. Karena itu, diperlukan pemodelan pemilihan lokasi embung yang optimal. Penelitian ini memodelkan cara identifikasi lokasi embung, yang sesuai standar biofisik dan sosial ekonomi dengan metode *multi criteria analysis* (MCA) berbasis sistem informasi geografis (GIS) dan data hujan satelit *Global Satellite Mapping of Precipitation* (GSMaP). Hasil analisis MCA berbasis GIS dengan luaran peta lokasi potensial embung diverifikasi melalui observasi lapangan. Penelitian ini memodelkan salah satu embung potensial sebagai *off-stream reservoir* dengan HEC-HMS. Hasil penelitian menunjukkan bahwa penggunaan data curah hujan GSMaP dapat digunakan dalam analisis hidrologi terutama di daerah dengan data curah hujan pengamatan yang terbatas. Hasil analisis kriteria aspek biofisik menunjukkan bahwa sekitar 50% orde sungai 1 dan 2 memenuhi syarat sebagai lokasi potensial embung. Persentase orde sungai 1 dan 2 yang layak sebagai lokasi potensial embung kemudian menurun menjadi 27% atau 56 lokasi ketika faktor sosial ekonomi diperhitungkan dalam analisis. Hasil observasi lapangan menemukan 13 lokasi potensial embung yang memiliki lembah/palung alamiah. Pemodelan alihragam hujan-aliran untuk *off-stream reservoir* dalam penelitian ini berpotensi mengurangi volume limpasan 7,58% di muara sungai utama DAS Manikin. Pemodelan dalam penelitian ini menunjukkan bahwa air baku dari *off-stream reservoir* dapat memenuhi keperluan domestik 5.063 penduduk, dan pertanian hortikultura 10 ha selama lebih dari 5 bulan pada musim kemarau. Model identifikasi lokasi potensial embung dengan metode MCA berbasis GIS dapat digunakan, namun hasil pemodelan perlu diverifikasi dengan observasi lapangan. Selain itu, data hujan satelit dan parameter DAS yang digunakan dalam analisis alihragam hujan-aliran perlu divalidasi dan dikoreksi agar memenuhi parameter statistik.

Kata Kunci: embung; *off-stream reservoir*; GSMaP; MCA-GIS; mitigasi bencana

ABSTRACT

Since the province of East Nusa Tenggara (NTT) is a semi-arid area that frequently experiences episodes of drought and flooding, it is imperative to take measures to mitigate these natural disasters, such as building *embungs* and off-stream reservoirs. Since the 1980s, embungs have gained popularity in Indonesia's semi-arid regions. However, because of their limited storage capacity, *embungs* are unable to optimally provide water needs. Therefore, identification of suitable *embungs* location is required. This study models the use of the multicriteria analysis (MCA) method based on geographic information systems (GIS) and Global Satellite Mapping of Precipitation (GSMaP) satellite rainfall data to identify *embungs* locations that satisfy biophysical and socioeconomic standards. Field observations were used to confirm the findings of the GIS analysis, which produced a map of possible *embungs* locations. One of the possible *embungs* was modeled using HEC-HMS as an off-stream reservoir. The findings demonstrated that GSMaP rainfall data can be applied to hydrological analysis, particularly in regions where there is a scarcity of observed rainfall data. According to the analysis of the biophysical aspect criteria, around half of the river orders 1 and 2 are suitable for possible *embungs* locations. When socioeconomic considerations were incorporated into the analysis, the percentage of river orders 1 and 2 that were eligible as possible *embungs* locations decreased to 27%, or 56 sites. Based on field observations, there are 13 possible *embungs* sites with naturally formed valleys. This study's rainfall-runoff transformation modeling for off-stream reservoirs could reduce the runoff volume by 7.58% at downstream of Manikin watershed. The study's modeling indicates that 5,063 households' domestic demands and 10 ha of horticultural cultivation can be fulfilled by the off-stream reservoir for more than five months during the dry season. The GIS-based MCA technique has a robust model for locating possible embung; nevertheless, field observations are required to confirm the modeling outcomes. The watershed parameters and satellite rainfall data used in the rainfall-runoff transformation study must also be verified and corrected in order to satisfy statistical requirements.

Keywords: *embungs*; off-stream reservoir; GSMaP; HEC-HMS; disaster mitigation