UNIVERSITAS
GADJAH MADA
PEMBUATAN PETA KERAWANAN POTENSI GENANGAN BANJIR DENGAN METODE WEIGHTED OVERLAY (Studi Kasus: Kawasan Industri Hijau Desa Mangkupadi, Kec. Tanjung Palas Timur, Kab. Bulungan, Prov. Kalimantan Utara)
Enggar Saputro, Hidayat Panuntun, S. T., M. Eng., D. Sc
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

INTISARI

Kawasan Industri Hijau yang dibangun di Desa Mangkupadi, Kecamatan Tanjung Palas Timur, Kabupaten Bulungan, Provinsi Kalimantan Utara, merupakan salah satu wilayah di Indonesia yang memiliki kerawanan potensi genangan banjir. Hal ini dikarenakan keadaan topografi yang didominasi oleh dataran rendah, jenis tanah yang kurang baik dalam hal drainase, dan intensitas hujan yang tinggi. Adanya rencana pembangunan Kawasan Industri Hijau akan mengurangi area resapan air. Oleh karena itu perlu upaya preventif penanggulangan masalah banjir. Dengan belum adanya peta kerawanan potensi genangan banjir yang dibuat, penentuan prioritas dalam mengurangi risiko genangan banjir menjadi kurang terarah. Oleh karena itu, perlu dilakukan pembuatan peta kerawanan potensi genangan banjir. Tujuan dari pembuatan peta tersebut ialah untuk mengetahui sebaran kerentanan spasial sebagai langkah awal pengurangan risiko genangan banjir.

Pembuatan peta kerawanan potensi genangan banjir disusun menggunakan sebelas parameter antara lain curah hujan, tutupan lahan (*block plan*), elevasi, kemiringan lereng, *Stream Power Index* (SPI), *Topographic Weatness Index* (TWI), *Topographic Position Index* (TPI), *Normalized Difference Vegetation Index* (NDVI), kerapatan aliran, jarak ke sungai, dan jarak ke jalan. Data curah hujan diperoleh dari mengombinasikan data stasiun BMKG dan citra satelit *Climate Hazard Group Infrared Precipitation with Station* (CHIRPS). Data elevasi dan kemiringan lereng diperoleh dan diekstraksi dari data LiDAR. Data SPI, TWI, dan TPI didapatkan dari proses pengolahan DTM hasil ekstraksi data LiDAR. Data NDVI didapatkan dari pengolahan Sentinel 2A. Data tutupan lahan diperoleh berdasarkan data rencana *block plan* Kawasan Industri Hijau. Data kerapatan aliran diperoleh dari operasi *line density* terhadap jaringan sungai. Data jarak ke sungai dan jalan didapatkan dari .shp jaringan sungai dan jalan kawasan. Setiap parameter diklasifikasi dan di-*scoring* berdasarkan kelas kerentanan potensi genangan banjir. Setiap parameter yang ditelah di-*scoring* dibobotkan dan dilakukan *overlay* menggunakan operasi *map algebra* atau disebut *weighted overlay*. Hasil *overlay* dilakukan klasifikasi menjadi tiga kelas kerentanan dengan interval yang sama setiap kelasnya, yaitu rendah, sedang, dan tinggi dengan nilai indeks kerentanan 272 sampai dengan 460.

Peta kerawanan potensi genangan banjir di Kawasan Industri Hijau Kabupaten Bulungan berhasil dibuat berdasarkan sebelas parameter kerentanan lingkungan yang mempengaruhi. Berdasarkan peta kerawanan potensi genangan banjir yang telah dibuat, Kawasan Industri Hijau memiliki tiga tingkat kerawanan potensi genangan banjir, meliputi rendah, sedang, dan tinggi. Kerawanan potensi genangan banjir Kawasan Industri Hijau didominasi tingkat kerawanan sedang dengan persentase 67% atau 8.875,66 ha. Area sekitar pantai memiliki kelas kerawanan tinggi terjadinya genangan banjir. Kelas kerawanan tinggi didominasi oleh area yang akan digunakan sebagai area industri dengan persentase 61% atau 1924,62 ha.

Kata kunci: Kerentanan, Banjir, AHP, *Weighted Overlay*, Parameter Banjir

UNIVERSITAS
GADJAH MADA
PEMBUATAN PETA KERAWANAN POTENSI GENANGAN BANJIR DENGAN METODE WEIGHTED OVERLAY (Studi Kasus: Kawasan Industri Hijau Desa Mangkupadi, Kec. Tanjung Palas Timur, Kab. Bulungan, Prov. Kalimantan Utara)
Enggar Saputro, Hidayat Panuntun, S. T., M. Eng., D. Sc
Universitas Gadjah Mada, 2024 | Diunduh dari http://etd.repository.ugm.ac.id/

ABSTRACT

The Green Industrial Estate built in Mangkupadi Village, East Tanjung Palas Sub-district, Bulungan Regency, North Kalimantan Province, is one of the areas in Indonesia that is prone to potential flooding. This is due to the topography which is dominated by lowlands, poor soil types in terms of drainage, and high rainfall intensity. The planned development of the Green Industrial Estate will reduce the water catchment area. Therefore, preventive efforts to overcome flooding problems are needed. With the absence of a map of the vulnerability of potential flood inundation, prioritization in reducing the risk of flood inundation is less directed. Therefore, it is necessary to make a map of the vulnerability of potential flood inundation. The purpose of the map is to determine the spatial distribution of vulnerability as a first step in reducing the risk of flood inundation.

The flood inundation vulnerability map was prepared using eleven parameters, including rainfall, land cover (block plan), elevation, slope, Stream Power Index (SPI), Topographic Weatness Index (TWI), Topographic Position Index (TPI), Normalized Difference Vegetation Index (NDVI), stream density, distance to river, and distance to road. Rainfall data was obtained from combining BMKG station data and Climate Hazard Group Infrared Precipitation with Station (CHIRPS) satellite images. Elevation and slope data were obtained and extracted from LiDAR data. SPI, TWI and TPI data were obtained from DTM processing of LiDAR data extraction results. NDVI data was obtained from Sentinel 2A processing. Land cover data was obtained based on the Green Industrial Area block plan data. Flow density data is obtained from line density operation on river network. Distance to river and road data is obtained from .shp river and road network of the area. Each parameter is classified and scored based on the vulnerability class of potential flood inundation. Each parameter that has been scored is weighted and overlaid using map algebra operations or called weighted overlay. The overlay results were classified into three vulnerability classes with equal intervals for each class, namely low, medium and high with a vulnerability index value of 272 to 460.

The vulnerability map of potential flood inundation in the Green Industrial Area of Bulungan Regency was successfully created based on eleven influencing environmental vulnerability parameters. Based on the map of potential flood inundation vulnerability that has been made, the Green Industrial Estate has three levels of potential flood inundation vulnerability, including low, medium and high. The vulnerability of potential flood inundation in the Green Industrial Area is dominated by the medium vulnerability level with a percentage of 67% or 8,875.66 ha. Areas around the coast have a high vulnerability class for flood inundation. The high vulnerability class is dominated by areas that will be used as industrial areas with a percentage of 61% or 1924.62 ha.

Keywords: Vulnerability, Flood, AHP, Weighted Overlay, Flood Parameters