

PEMANFAATAN FOTO UDARA FORMAT KECIL UNTUK
EKSTRAKSI *DIGITAL TERRAIN MODEL (DTM)* MENGGUNAKAN
METODE *TERRAIN FILTERS* DAN *SLOPE-BASED FILTERING*

Studi Kasus: Pemodelan Genangan Tsunami Pantai Drini,
Kabupaten Gunungkidul, Daerah Istimewa Yogyakarta

ABSTRAK

Data spasial yang berkualitas dapat digunakan dalam berbagai bidang penelitian yang menghasilkan suatu pemodelan yang akurat. Selain data yang berkualitas, juga dibutuhkan metode yang tepat dalam melakukan pemrosesan data. Foto udara dalam penelitian ini merupakan data spasial berkualitas yang digunakan sebagai sumber data utama dalam pemodelan genangan tsunami. Namun untuk menghasilkan pemodelan yang akurat, diperlukan ekstraksi *Digital Surface Model (DSM)* menjadi *Digital Terrain Model (DTM)* dengan menggunakan metode *terrain filters* dan metode *slope-based filtering*. Penelitian ini bertujuan untuk (1) Melakukan analisis perbandingan hasil ekstraksi DTM menggunakan metode *terrain filters* dan *slope-based filtering*, (2) Memetakan persebaran genangan tsunami di kawasan Pantai Drini dan sekitarnya, dan (3) Menghitung estimasi kerugian akibat bencana tsunami di kawasan Pantai Drini dan sekitarnya.

Proses ekstraksi DTM metode *terrain filters* dilakukan dengan memanfaatkan *tool DEM Editing* dengan perintah *Terrain filters (hilly)*, sedangkan ekstraksi DTM metode *slope-based filtering* dilakukan dengan memanfaatkan *tool DTM filter (slope-based)*. Penelitian ini difokuskan untuk membandingkan kedua metode hasil ekstraksi DTM yang dilanjutkan dengan melakukan pemodelan tsunami. Pemodelan menggunakan skenario ketinggian *run-up* 2 m, 8 m, dan 14 m dengan menerapkan konsep *hydrological connected* berdasarkan batas pasang tertinggi air laut dan data historis kejadian tsunami di pesisir selatan Pulau Jawa. Perhitungan estimasi kerugian berdasarkan luas area penggunaan lahan terdampak tsunami dan harga nilai aset.

Nilai akurasi DTM metode *terrain filters* 0,685 m, sedangkan nilai akurasi DTM metode *slope-based filtering* 0,693 m. Kedua metode tersebut masuk dalam tingkat ketelitian kelas 1 pada skala 1:5.000 menurut Perka BIG No. 15 Tahun 2014. Berdasarkan profil melintang menunjukkan nilai ketinggian DTM metode *slope-based filtering* lebih rendah dibandingkan dengan DTM *terrain filters*. Pemodelan tsunami menunjukkan area terdampak paling besar berada di sekitar Pantai Drini. Estimasi kerugian terbesar terjadi pada data DTM metode *slope-based filtering* skenario 14 m luas area terdampak 47,348 ha dengan nilai kerugian Rp206.377.004.704.

Kata Kunci: Foto Udara, DSM, DTM, *slope-based filtering*, Tsunami.

***THE UTILIZATION OF SMALL FORMAT AERIAL PHOTOGRAPH FOR
EXTRACTING OF DIGITAL TERRAIN MODEL (DTM)
USING TERRAIN FILTERS AND SLOPE-BASED FILTERING METHODS
Study Case: Inundation Modeling of Tsunami at Drini Beach,
Gunungkidul Regency, Special Region of Yogyakarta***

ABSTRACT

Quality spatial data can be used in various research fields to produce an accurate model. In addition to quality data, appropriate methods of data processing are also needed. Aerial photography in this study is quality spatial data that is used as the main data source in tsunami inundation modeling. However, to produce an accurate model, it is necessary to extract the Digital Surface Model (DSM) into a Digital Terrain Model (DTM) using terrain filters and slope-based filtering methods. This study aims to (1) perform a comparative analysis of DTM extraction results using terrain filters and slope-based filtering methods, (2) map the distribution of tsunami inundation in the Drini Beach area and its surroundings, and (3) calculate the estimated loss due to the tsunami disaster in the coastal area. Drini and its surroundings.

The DTM extraction process for the terrain filters method is carried out using the DEM Editing tool with the Terrain filters (hilly) command, while the DTM extraction for the slope-based filtering method is performed using the DTM filter (slope-based) tool. This research is focused on comparing the two DTM extraction methods followed by tsunami modeling. The modeling uses scenarios of run-up heights of 2 m, 8 m, and 14 m by applying the concept of hydrological connected based on the highest tide limit and historical data on tsunami events on the southern coast of Java Island. Calculation of the estimated loss based on the area of land use affected by the tsunami and the value of the asset.

The DTM accuracy value for the terrain filters method is 0.685 m, while the DTM accuracy value for the slope-based filtering method is 0.693 m. Both methods are included in the level of accuracy of class 1 on a scale of 1:5,000 according to Perka BIG No. 15 of 2014. Based on the transverse profile, the elevation value of the slope-based filtering method DTM is lower than that of the terrain filters. The tsunami modeling shows that the largest affected area is around Drini Beach. The largest estimated loss occurred in the DTM data using slope-based filtering scenario 14 m, the affected area was 47,348 ha with a loss value of Rp. 206,377,004,704.

Keywords: *Aerial Photography, DSM, DTM, Slope-based filtering, Tsunami.*