

INTISARI

Peristiwa gempa bumi tidak dapat diprediksi berdampak pada kerusakan fisik dan sosial mengakibatkan perubahan penutup/penggunaan lahan, bahkan hingga kerusakan pada bangunan. Pada 28 September 2018 gempa bumi dengan kekuatan 7,4 SR terletak 80 km di utara Kota Palu Sulawesi Tengah, diikuti dengan peristiwa tsunami mencapai ketinggian hingga 8 meter dari ketinggian air, mengakibatkan ratusan bangunan mengalami kerusakan. Kehadiran teknologi penginderaan jauh yang terus berkembang dapat dimanfaatkan untuk mengetahui dampak kerusakan dengan bantuan integrasi Sistem Informasi Geografis (SIG).

Tujuan dari penelitian ini adalah identifikasi awal kerusakan bangunan pasca gempa bumi di sebagian Kota Palu menggunakan pendekatan *Object Based Image Analysis (OBIA)* pada citra satelit WorldView-2 bentuk RGB, uji akurasi interpretasi *Object Based Image Analysis (OBIA)* terhadap hasil segmentasi dan klasifikasi, dan analisis perubahan pola spasial melalui penutup/penggunaan lahan citra pasca dan pra gempa bumi. Metode yang digunakan dalam penelitian ini adalah *Object Based Image Analysis (OBIA)* terdiri dari tahap segmentasi dan klasifikasi. Tahap segmentasi menggunakan algoritma *Multiresolution Segmentation* dan tahap klasifikasi algoritma *Nearest Neighbor* berdasarkan *sample based* dan *rule based*. Selanjutnya digunakan untuk menghasilkan segmentasi terbaik, skema klasifikasi penutup/penggunaan lahan, pemilihan *feature space*, dan identifikasi kerusakan melalui perubahan pola spasial.

Penggunaan data citra WorldView-2 bentuk RGB dan metode *Object Based Image Analysis (OBIA)* dapat mengidentifikasi kerusakan awal bangunan hanya sebatas kelas kerusakan, identifikasi lebih lanjut menggunakan data tambahan. Dimana 307 titik bangunan mengalami kerusakan (136 hancur, 95 rusak, 69 mungkin rusak, tidak ada kerusakan). Hasil uji akurasi segmentasi terbaik *scale* 70, *shape* 0,4, dan *compactness* 0,8. Hasil klasifikasi citra pasca gempa bumi *overall accuracy* 83,95% dan *Overall accuracy* untuk citra pra gempa bumi 90,73%. Pola spasial untuk kerusakan bangunan mengelompok (*cluster*) $R < 0,7$ dan kerusakan berupa perubahan lahan tersebar merata (*random*) $0,7 < R < 1,4$.

Kata Kunci: Identifikasi, Kerusakan, Kota Palu, *Object Based Image Analysis (OBIA)*, WorldView-2

ABSTRACT

An unpredictable earthquake event might impact on physical and social damages, including the changes of land cover/use, even destruction in buildings. On September 28th 2018, an earthquake with a magnitude of 7.4 on the Richter scale was located in 80 km of the north of Palu City, Central Sulawesi, followed by a tsunami that reached a height of up to 8 meters above the water level, resulting damages to hundreds of buildings. The presence of remote sensing technology which continuously develops can be used to determine the impact of damages by the assistance of the integration of Geographical Information Systems (GIS).

The aims of this study were identification of the post-earthquake initial damages of the buildings in several parts of Palu City using the Object Based Image Analysis (OBIA) approach on the RGB WorldView-2 satellite imagery, accuracy test of the Object Based Image Analysis (OBIA) interpretation for the segmentation and classification results, and analysis of spatial patterns changes through post- and pre-earthquake land cover/use imagery. The method used in this research was Object Based Image Analysis (OBIA) consisting of segmentation and classification stages. The segmentation stage applied the Multiresolution Segmentation algorithm and the classification stage utilized Nearest Neighbor algorithm based on sample and rule. Then, to produce the best segmentation, land cover/use classification scheme, feature space selection, and damage identification through changes in spatial patterns were examined.

The use of WorldView-2 image data in RGB form and the Object Based Image Analysis (OBIA) method for the identification of initial damages of the buildings was limited only on the damage area. Thus, for further identification, additional data were needed. There were 307 building points damaged (136 destroyed, 95 damaged, 69 possibly damaged, no damage). The best segmentation accuracy test results scale 70, shape 0.4, and compactness 0.8. The classification results for the post-earthquake image indicated 83.95% overall accuracy of and for pre-earthquake images presented 90.73% overall accuracy. The spatial patterns of cluster building damages showed $R < 0.7$ and random land change damages resulted $0.7 < R < 1.4$.

Keywords: *Identification, Damage, Palu City, Object Based Image Analysis (OBIA), WorldView-2*