

## Analisis Ketergangguan Tutupan Vegetasi Menggunakan Spasio-Temporal Landscape Metrics Penutupan Lahan di Lereng Barat Hutan Bukit Pohen – Bali

Oleh

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### INTISARI

Kawasan lereng barat Bukit Pohen -Bali merupakan kawasan hutan dataran tinggi dimana pada lereng bawahnya dimanfaatkan menjadi pemukiman dan lahan pertanian. Adanya histori kebakaran hutan, eksplorasi panas bumi, dan aktivitas penduduk mengakibatkan gangguan pada kawasan tersebut. Citra spasio-temporal resolusi tinggi (*Pleaid*es 2014 dan *Planet*scope 2022) digunakan untuk analisis *landscape metrics* perubahan penutupan lahan dan tingkat ketergangguan (LG) kawasan hutan. Analisis regresi logistik ordinal (RLO) memodelkan LG terhadap variabel prediktor (elevasi, kelerengan, kerapatan tutupan kanopi, dan keanekaragaman vegetasi). Penelitian ini menggunakan random sampling dengan intensitas sampling 0,78% dari 195 ha (38 plot sampel). Tujuan penelitian ini untuk mengidentifikasi perubahan *landscape metrics* penutupan lahan dan menganalisis pengaruh variabel prediktor terhadap LG.

Selama 9 tahun (2014-2022), kondisi hutan lereng barat Bukit Pohen relatif terjaga dengan baik, dimana tegakan hutan meningkat 3% menjadi 78% dari proses suksesi, peningkatan kerapatan hutan, dan penanaman. Total penambahan penutupan vegetasi sebesar 35,20% dan pengurangannya total 14,15%. Degradasi dan deforestasi terjadi secara minor akibat perabasan, pohon tumbang, program perhutanan sosial, dan erosi tanah. Nilai keanekaragaman ( $H'$ ) pada tingkat pohon, tiang, dan pancang rendah ( $H' < 1$ ), sedangkan  $H'$  semainya sedang ( $H' = 1,272$ ). Nilai kemerataan ( $E$ ) vegetasi penyusun tingkat pohon, pancang, dan semai menunjukkan stabil ( $E > 0,6$ ), namun pada tingkatan tiang cenderung labil ( $E = 0,523$ ). Dominasi tumbuhan bawah pada semai dijumpai jenis potensi invasif yaitu: *Ageratia riparia* dan *Austropatorium inulaefolium*.

Ketergangguan kawasan hutannya didominasi oleh kelas sedang (62%). Analisis RLO menghasilkan dua persamaan model yaitu model probabilitas LG rendah-sedang dan model probabilitas LG sedang-tinggi. Uji *Wald* menunjukkan bahwa model sesuai hipotesis  $H_1$  sedangkan variabel prediktor yang signifikan terhadap model adalah kerapatan tutupan kanopi dan elevasi. Uji *goodness of fit* model yaitu 0,7552 ( $p\text{-value} > \alpha = 0,05$ ) sehingga model sudah cocok untuk memprediksi LG. Uji *pseudo R* menghasilkan nilai 13,8% sehingga variabel prediktor yang digunakan berkontribusi kecil terhadap model.

**Kata kunci:** citra satelit, degradasi, keanekaragaman, prediktor, regresi logistik ordinal.

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## ***Analysis of the Vegetation Cover Disturbance Using Spatio-Temporal Landcover Landscape Metrics on the Western Slope of Mount Pohen Forest - Bali***

By

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### **ABSTRACT**

*The western slope area of Mount Pohen -Bali is a highland forest area where has been utilized for settlement and agriculture on these lower. The forest fires history, geothermal exploration, and human activities have disturbed the forest. Using the spatial-temporal of high-resolution images (Pleaidas 2014 and Planetscope 2022) can analyze the landscape metrics of landcover changes and the forest disturbance level (DL). The ordinal logistic regression (OLR) is modeling the DL based on predictor variables (elevation, slope, canopy closure density, and vegetation diversity). The study used random sampling with intensity 0.78% from 195 ha. This study is to identify the landcover changes using landscape metrics and analyze the influence of predictor variables on DL.*

*During nine years (2014-2022), the forest condition has been relatively well-preserved, increasing 3% to 78% from the succession, increased forest density, and planting processes. The gain result of vegetation cover is 35.20%, then the total loss is 14.15%. The degradation and deforestation mainly occurred as a minor consequence of shrub encroachment, fallen trees, social forestry program, and soil erosion. The vegetation diversity ( $H'$ ) at the tree, pole, and sapling levels were low ( $H' < 1$ ), while the  $H'$  seedling level was moderate ( $H' = 1.272$ ). The evenness ( $E$ ) values of tree, pole, and seedling have high levels ( $E > 0.6$ ) that indicating stabil, but the  $E$  pole level has moderate ( $E = 0.523$ ) or labil condition. The seedling plant dominance detected the invasive potentially such as *Ageratia riparia* and *Austropatorium inulaefolium*.*

*The DL indicated that to class moderate disturbance intensity (62%) as dominat area, primarily the forest area ex-fires. The OLR analysis yielded two probability models: the probabilities of comparing low - moderate disturbance and modeling the probabilities of comparing moderate - high disturbance. The significance test (Wald test) showed that the models fit hypothesis  $H_1$ , having the predictor variable that had the significant impact on DL was the canopy closure density and the elevation. The goodness of fit test resulted in a  $p\text{-value} > \alpha = 0.05$ , which is 0.7552, indicating that the model is suitable for predicting DL. The pseudo R test resulted 13.8%, so these variable predictors have the small contribution to model.*

**Keywords:** *satellite image, degradation, diversity, ordinal logistic regression, predictor*

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