

ABSTRACT

Land use changes and artificial light pollution in Sleman Regency have led to habitat fragmentation, threatening the conservation of moths (Lepidoptera) as nocturnal pollinators and environmental bioindicators. This study analyzes the effects of light spectrum variation and habitat characteristics on moth community structure across five land use types (forest, gardens, fields, rice paddies, and settlements), as well as community perceptions of environmental impacts. The research employed a mixed-method approach, combining quantitative methods (LED light trap observations in five land types, environmental parameter measurements) and qualitative methods (respondent perception interviews) from February to May 2025. Results indicate that forests are the optimal habitat with the highest abundance, featuring 43 individuals from 12 species, supported by NDVI >0.8 and 80-90% humidity. Blue light was most effective in attracting moths, with 50 individuals, but disrupted natural distribution. Statistical analysis revealed a strong correlation between NDVI-humidity and abundance ($r=0.878-0.941$), although the linear regression model was not significant ($p>0.05$). About 65% of the community reported a decline in moth populations, particularly in settlements with intense lighting. Thus, while blue and white lights are effective in attracting moths, they also disrupt natural distributions. Forests with high NDVI (>0.8) and stable humidity (80-90%) are optimal habitats. Community awareness of land use change impacts needs education on mitigation strategies based on research findings.

Keywords: Lepidoptera community, LED light spectrum, habitat fragmentation, NDVI, light pollution.

ABSTRAK

Perubahan penggunaan lahan dan polusi cahaya buatan di Kabupaten Sleman mengakibatkan fragmentasi habitat, mengancam kelestarian ngengat (Lepidoptera) sebagai polinator nokturnal dan bioindikator lingkungan. Penelitian ini menganalisis pengaruh variasi spektrum cahaya dan karakteristik habitat terhadap struktur komunitas ngengat di lima tipe penggunaan lahan (hutan, kebun, tegalan, sawah, permukiman), serta persepsi masyarakat terhadap dampak lingkungan. Metode penelitian menggabungkan pendekatan kuantitatif (pengamatan light trap LED di lima tipe lahan, pengukuran parameter lingkungan) dan kualitatif (wawancara persepsi responden) selama Februari-Mei 2025. Hasil menunjukkan hutan menjadi habitat optimal dengan kelimpahan tertinggi dengan 43 individu dari 12 spesies yang didukung NDVI >0.8 dan kelembaban 80-90%. Cahaya biru paling efektif menarik ngengat dengan 50 individu, namun mengganggu distribusi alami. Analisis statistik mengungkap korelasi kuat NDVI-kelembaban dengan kelimpahan ($r=0.878-0.941$), meskipun model regresi linier tidak signifikan ($p>0.05$). Sebanyak 65% masyarakat melaporkan penurunan populasi ngengat, terutama di permukiman dengan pencahayaan intensif. Maka cahaya biru dan putih paling efektif menarik ngengat, tetapi juga mengganggu distribusi alami. Hutan dengan faktor NDVI tinggi (>0.8) dan kelembaban stabil (80-90%) menjadi habitat optimal. Persepsi masyarakat dalam memahami dampak perubahan lahan perlu edukasi tentang strategi mitigasi berbasis temuan penelitian.

Kata kunci: komunitas Lepidoptera, spektrum cahaya LED, fragmentasi habitat, NDVI, polusi cahaya.