

Forest Fragmentation Patterns in northwest Indiana.

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Overview:

Rapid population growth in the Chicago Metropolitan Area is accelerating urban expansion into the northwest Indiana region (especially for Lake County, Porter County, and LaPorte County), causing forest cover to decline and raising concerns for local communities to access essential forest ecosystem services (e.g., recreation, erosion control, heat-island effect mitigation, biodiversity habitat). Thus, it's vital to evaluate the extent of forest fragmentation within this region for conservation planning.

Method:

In this preliminary study, we assessed township-level forest fragmentation patterns by first extracting forest areas from the national land cover dataset (NLCD). We then conducted morphological spatial pattern analysis (MSPA) to classify forests into seven distinct categories by considering forest patch size, shape, and connectivity (Figure 1). Zonal analysis was then used to extract the percentage area of each forest class within each township.

Results:

- 60% townships have less than 30% forest canopy cover, with most undisturbed forests distributed in northern Porter County and LaPorte County (Figure 2A & 2B).
- Small, isolated forest patches (islets) are mostly found in northern Lake County, central Porter County, and west LaPorte County (Figure 2C).
- Narrow forest corridors (bridges) connecting two large forested areas are mostly found in northern Lake County (Figure 2D).

Next step:

Using geo-statistics to classify townships into clusters based on their fragmentation levels. Townships with unique characteristics may be further studied to help develop forest preservation strategies.

FOR FURTHER READING:

Soille, P. and Vogt, P.: MORPHOLOGICAL SPATIAL PATTERN ANALYSIS: OPEN SOURCE RELEASE, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLVIII-4/W1-2022, 427-433, <https://doi.org/10.5194/isprs-archives-XLVIII-4-W1-2022-427-2022>

Rogan, J., Wright, T. M., Cardille, J., Pearsall, H., Ogneva-Himmelberger, Y., Riemann, R., Riitters, K., & Partington, K. (2016). Forest fragmentation in Massachusetts, USA: a town-level assessment using Morphological spatial pattern analysis and affinity propagation. *GIScience and Remote Sensing*, 53(4), 506-519. <https://doi.org/10.1080/15481603.2016.1141448>

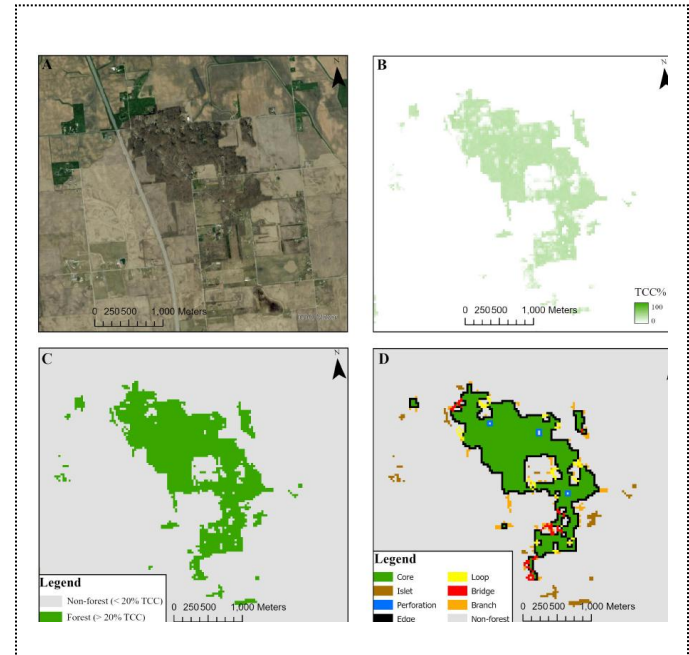


Figure 1. Visual demonstration of A). An aerial photo of a forest, B). Tree canopy cover, C). Reclassified presence/absence map of forest, and D). Forest fragmentation map from MSPA.

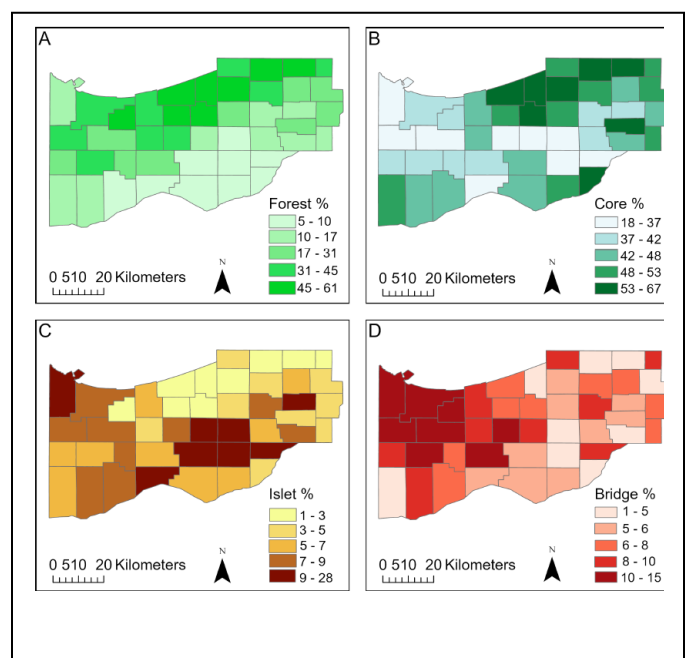


Figure 2. Quantile classifications of A). Forest cover %, B). Forest core%, C). Forest islet %, and D). Forest bridges % in the Three-counties Region.