Assessments of the Ecological and Economic Functions of Urban Parks in Hamilton County, Ohio, through a Modeling Approach

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Abstract

The role of city parks is becoming more important in our crowded society, especially in providing wildlife habitats and recreation activities. This research focuses on ecological and economic functions of city parks. Using the Habitat Quality Model and Recreation Model in InVEST, habitat quality for woodpeckers and passage flow volume (representing the economic profits) for recreation are modeled. According to the different land-use types (Water, Developed & Barren, Forest & Shrub, Cultivated, Wetlands, Parks), the study area can be divided into habitats or threats for woodpeckers with various degrees of sensitivity. Altitude, road density, edge effect, etc. are treated as threats. Based on existing threats, predictive maps of habitat degradation and quality are produced. Trails, benches, reaction area, waterbody, vegetation coverage, etc. are considered as factors attractive to park visitors. With the population of visitors as the dependent variable, a regression model is used to explore the factors potentially contributory to park visits. Maps generated from this study reveal the places that attention is warranted to combat the degradation trend, and the regression model provides information to help us promote park visits. We believe this study will be useful not only to academia but also to the city park managers as they want to further park development.

Study Area

Figure 1. Woodpeckers recorded in Hamilton County
(Deteriorated habitat quality is denoted by a decreasing habitat quality rate)

Figure 2.1. Original Habitat Quality

Figure 2.2. Predicted Habitat Quality

Table 1. Sensitivity of Habitat Quality and Threats; the value ranging from 0 to 1 depicts the weight used in the calculations

Table 2. Coefficients of Factors

Results

• Parks that were surrounded by developed area will have a higher degree of degradation than others. Some smaller parks can be completely degraded (Figure 2).
• The habitat quality for woodpeckers can be improved if the land can connect to enough high-quality lands (Figure 2).
• The number of benches, the availability of recreation facilities/water, and the length of trails had a positive relationship with the population of visitors (Table 2 & Equation 1).
• The areal extent of parks has a negative correlation with the number of visitors (Table 2).

The t values of DEM and the availability of playground were so small; it seems that they are not important in attracting visitors (Table 2).

Reference