

Vulnerability Methodology Summary

Background:

The vulnerability layer evaluates the relative potential risk of future land conversion to urban uses. Vulnerability is defined as function of suitability for development and proximity to growth “hot spots.” The vulnerability layer is useful as a stand-alone layer to evaluate development trends, but can also be combined with the other RLA layers to prioritize land conservation efforts.

Data Layers:

1990 and 2000 Census Block Group polygons attributed with housing data
1990 Census Rural-Urban Commuting Areas
2000 Census Blocks
2000 Land Cover
1990 and 2000 Impervious Surface Cover
National Elevation Dataset
Parcel point data for selected counties in Maryland
1998 GDT Roads
2000 TIGER Roads
Square-mile overlay quadrant

Methodology:

1. Identify lands suitable for development by classifying areas with steep slopes, emergent wetlands, open water, surface mines, major roads, and areas distant from roads as unsuitable for development.
2. Spatially distribute 1990 and 2000 census block group data for single-detached housing units to a 30-meter road density grid on the basis of the relative proportion of road density values within each block group.
3. Difference the single-detached housing unit grids for 1990 and 2000 and summarize the result for each square-mile cell in the overlay quadrant.
4. Derive a statistical relationship between mean parcel size and road density for each square-mile cell in the overlay quadrant.
5. For each square-mile cell, convert estimates of single-detached housing unit change into estimates of residential land conversion using the statistical relationship found in step #4.
6. Group the overlay quadrant cells into urban, suburban, and rural zones on the basis of the 1990 Rural-Urban Commuting Areas. Compute thresholds of significant change in residential land conversion separately for each zone and label as residential growth “hot spots”.
7. Summarize the change in impervious surfaces from 1990 to 2000 for each overlay quadrant cell and derive a single threshold of significance using ESRI’s “natural breaks” classification algorithm to identify impervious growth “hot spots”.
8. Estimate proximity to all hot spots on the basis of mean travel time along the existing road network to each hot spot.