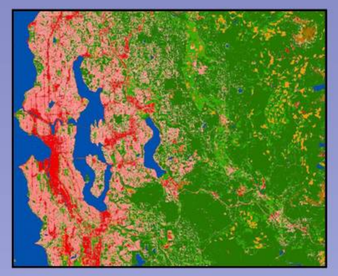

Evaluating Urban Forest Functionality:

A three dimensional approach.

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Overview

Management and protection of urban forest function has typically focused on a limited number of the many benefits of urban forests. It is important to understand that unaddressed benefits are also influenced by these narrowly focused management plans.

Our research aims to investigate three primary functions for which forests in residential areas are protected and managed: ***economic***, ***ecological***, and ***social***. We will study aspects of these benefits directly as well as the tradeoffs involved in emphasizing one over another.

Research Questions

1. *How do the ecological, economic, and social functions of urban forests in residential areas change with the **amount**, **distribution** and **location** of forests?*
2. *Are there **tradeoffs** or **other relationships** between the different forest functions?*
3. *Can **thresholds** be identified for the measures of functions that are related to forest patch size, amount of forest and location along the urban gradient?*
4. *Can these results be developed into a **framework for policy and decision-making** processes regarding forested open space protection in King County?*

How will we do this?

We are creating an independent model for each function. We will evaluate the response of each function (economic, ecological, and social) to the same urban gradient measures. By having common axes we can compare responses and look for interactions or tradeoffs between functions.

Ecological Function

Definitions/ Approach

Ecological functionality will be considered by evaluating how closely forested areas resemble 'natural' or pre-settlement systems with regards to biodiversity and productivity.

Methods/ Results

We will use Canonical Correspondence Analysis (CCA) with existing avian point count and vegetation survey data from King County, WA (Donnelly 2002) to evaluate ecological functionality.

Economic Function

We define economic functionality of forests in terms of the added monetary value of homes directly attributable to nearby forested areas.

We will use a hedonic model of single-family housing prices to assess economic effects. Preliminary results suggest that a 10% decrease in forest cover (600 m cell) will result in a decrease of about 2% in housing price.

Social Function

We view social functionality of forests in terms of the non-monetary benefits that people gain from forests. Examples include use of forests for recreation, and indirect benefits such as a sense of neighborliness or peace of mind.

A mailed survey will be distributed to a stratified random sample of households across our urban gradient in King County to evaluate the social functionality of forests.

Urban Gradient

The urban gradient is based on four measures: percent forest, population density, distance to nearest forest patch, and size of nearest forest patch. Percent forest (Fig. 1) and forest patch designations (Fig. 3) were based on 1999 LandSat imagery (Alberti et al. 2002).

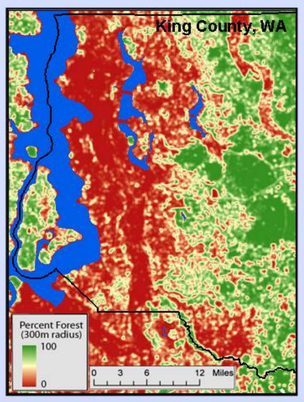

Figure 1. Percent forest was calculated for a circular neighborhood, radius 300m.

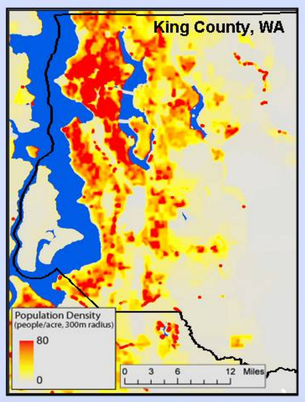

Figure 2. Population density is based on year 2000 census tract data and calculated using a circular neighborhood, radius 300m.

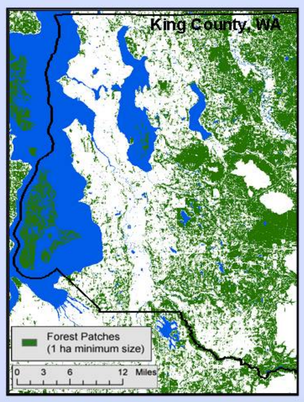

Figure 3. Forest patches were defined using an 8-way region group (1 ha. Minimum size). Distance to and size of nearest patch were measured using this coverage.

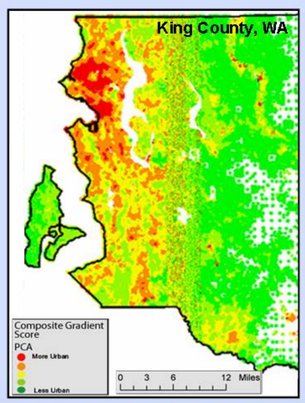

Figure 4. Composite gradient score for each parcel centroid and bird count point calculated by a Principal Component Analysis on the four gradient measures.

Next Steps:

- Obtain final clearance from the Institutional Review Board and distribute mail surveys
- Develop gradient measures for 600m, 900m, and 1200m radii to evaluate the sensitivity of our functionality measures.
- Further refine the hedonic price model using parcel-based landscape measures.
- Input and analyze results from mailed social survey.

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Alberti, M., R. Weeks, D. Booth, K. Hill, S. Coe, and E. Stromberg. 2002. Land cover change analysis for the Central Puget Sound Region. Final report for the Puget Sound Water Quality Action Team. Seattle, WA.
Donnelly, R.E. 2002. Design of habitat reserves and settlements for bird conservation in the Seattle metropolitan area. Ph. D. dissertation, University of Washington, Seattle, WA.