Parks & Open Space:

A Demand & Supply Analysis of Existing Public and Private Open Space in Montgomery County, Maryland

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Executive Summary

Montgomery County Planning's Energized Public Spaces Functional Master Plan (EPS FMP), which focused primarily on the Silver Spring Central Business District, inventoried the supply of existing parks and open spaces, estimated the demand for parks and open space based on the presence of population and jobs, and identified areas where service gaps exist. The Fall 2017 URSP688L PALS program took the same approach as the EPS FMP, but expanded the study to the whole County, establishing a Set 1 Data and Map. We then created an alternative framework analysis using additional variables to further expand the study's scope to establish a Set 2 Data and Map.

In this alternative framework analysis (Set 2), the park supply for Montgomery County was determined by assigning a score based on amenities in each park. A walkshed was created for each park and the acre grid of Montgomery County in which it is located using a walkshed network analysis that calculated a one mile walk distance from each grid. Park demand was determined by including the following variables: population density, housing density, age, zero car households, and access to private gardens/yards, based on whether a property was multi-family or not. By analyzing the data on public and semi-public parks and factors known to influence their demand, we developed a composite scoring system to identify current service gaps in park lands within Montgomery County, and compared the Set 1 and Set 2 Data. The Set 2 data indicated more significant service gaps in park supply and demand throughout the County, but both Set 1 and Set 2 data indicated a need for more parks in the County's more rural north and west areas. We recommend undertaking further research using additional variables and advanced analysis tools as this project proceeds into Spring 2018.

Background and Prior Research

Background - Existing and Alternative Analysis Framework

One of the visions of the Maryland-National Capital Park and Planning Commission (M-NCPPC) Master Plan is:

"An innovative and creative countywide park plan for stronger, healthier, and happier communities in the County. In the places where we have the most people, everyone can walk to a public space to enjoy the outdoors."

To achieve this vision, The Department of Parks created the *Energized Public Spaces Functional Master Plan* (EPS FMP) to guide the development of outdoor spaces in areas where people live and work so that people of all ages and ethnicities can meet, play, relax, exercise, and enjoy nature. The plan:

- identifies where parks are needed most
- proposes funding sources to purchase new parkland
- prioritizes funding.

At the start of this project, we were provided with EPS output data, a County map with sample images and one-acre overlay, the data for parks and open spaces, property information, pedestrian network, and the walkshed for downtown Silver Spring.

The EPS FMP:

- focused on the Silver Spring Central Business District (CBD)
- inventoried the supply of existing parks and open spaces and scored them based on the provision of active, contemplative, and social opportunities
- estimated the demand for parks and open space based on the presence of population and jobs
- identified acres with service gaps exist (supply < demand).

The initial framework, known as Set 1, estimated the demand scores for parks and open spaces based on employment and population data provided by the U.S. Census, and used that information to identify service gaps. Subsequently, Montgomery Planning desired to expand the scope of the EPS FMP from the Silver Spring Central Business District to the entire County, and to consider an Alternative Analysis Framework (Set 2) to evaluate the gap between park supply and park demand throughout the County. The University of Maryland's PALS Program was asked to undertake this task.

The Fall 2017 USRP 688L PALS program has:

- expanded the inventory of the supply of existing parks and open spaces from the Silver Spring CBD to the entire County
- included privately owned properties with their open space, and scored them using the same EPS method used in Set 1
- estimated the demand for parks and open space based on population, jobs, socioeconomic status, age, zero car households, and access to private gardens/yards
- developed alternative park demand and supply scores
- identified acres where service gaps exist (supply < demand), similar to Set 1.

To achieve this alternative analysis of park supply and demand, the PALS program:

- reviewed pertinent existing studies for park demand and supply scoring
- selected various measures of park demand and supply analysis
- identified two sets of indicators centered around a common geography
- incorporated data results to map a composite index for score gaps
- compared Set 1 and Set 2 data and maps.

Research Questions

The purpose of this research was to answer the following questions:

- Is there sufficient existing green space in Montgomery County? Where are the areas most in need of additional green space?
- Can the framework used by the County to uncover service gaps in Silver Spring be used for the entire County?
- Would more variables change the outcome and help make the analysis more precise? Where would a targeted addition of green space have the greatest effect?

Variables Selected and Analysis Approaches

For the Set 2 Data, the park supply scores were based on three different scales: a base acre grid of the County, a walkshed of each acre grid, and park scoring across the County.

The walkshed calculation outlined a one mile walking distance from the center of each acre grid in the County based on a network of sidewalks, walkways, and trails. Using a network of line features and junction points, the network was built to solve for the walkshed. To solve for all the County grids, the computing process was broken into sixteen geographic areas, and the final walkshed was merged from each section, resulting in an output layer of all walkshed outlines (see Appendix) for each acre grid in the County.

The first step in our methodology for identifying private properties and their proximity to public parks was to review the EPS output shapefiles and use parcels number to locate a property and its nearby park in ArcGIS. We then:

- cross-referenced the address with a Maryland State Department of Assessments and Taxation (SDAT) search, as well as information from the Montgomery Parks website
- created park scoring criteria, influenced by the method from Set 1, to rate a park's active, contemplative, and social features
- referred to maps and information from the Montgomery Parks website to assign scores for park features and calculate a total supply score
- entered the information into the ArcGIS attribute data table, and spatially joined this data with the demand scores and walkshed information.

According to the park scoring criteria, parks with a basketball court, softball field, tennis court, or soccer field, received an active and social score per feature. These elements seem to be the most effective to include in a park because they have an active as well as an inherently social component. For contemplative features, we looked at passive features, such as a pond, stream, or forest area where people could go to relax, reflect, and enjoy some alone time. In addition, we also included built features in the contemplative scores, such as a walking bridge or park trail. In

regard to social features, elements included outdoor seating, performance stages, eating areas, and picnic shelters. The final step was to combine the scores to create a total supply score per park, which was then used, along with the demand index, to locate possible gaps.

For the Set 2 data, the park demand scores were based on employment data at the block level, including office, retail and industrial uses, as well as socio-demographic data at the block-group level, including population density, median income, housing density, age of the head of household, and zero car households. Park demand was also based on data at the parcel level, including land use data that could indicate access to private gardens and yards (based on whether the properties were identified as multi-family or single-family land uses). Other data included in the demand scores were overall park use and walkability.

This data was used to create two maps, the Set 2 Supply Score (see Figure 2) and the Set 2 Demand Score (see Figure 3). The data was incorporated to map a composite index, the Set 2 Gap Analysis Results in Figure 4. Finally, the Set 1 and Set 2 maps (Figures 1 and 4, respectively) were compared.

Interpretation of Results

The demand score of each grid was subtracted from the supply score of each grid and multiplied by .05 to determine a score for each grid that depicted where gaps exist between the supply and demand of parks in Montgomery County. A discussion of gaps in supply for Set 1 and Set 2 analyses follows.

The Set 1 results, in Figure 1, show a relatively balanced supply-to-demand for parks across Montgomery County. However, gaps exist along I-270 and within the more urban areas surrounding the Beltway, depicting high supply of parks relative to demand. In contrast, higher gaps with high levels of demand and lower supply of parks exist in the County's more rural north and west areas, such as in Poolesville and toward Damascus.

In the Set 2 results, Figures 2 and 3 show high levels of both supply and demand for parks centered around I-270, Rockville, Silver Spring, and Wheaton. While Figure 2 shows pockets of supply based on park locations throughout the County, Figure 3 shows more concentrated demand around I-270, toward Burtonsville, and in Olney.

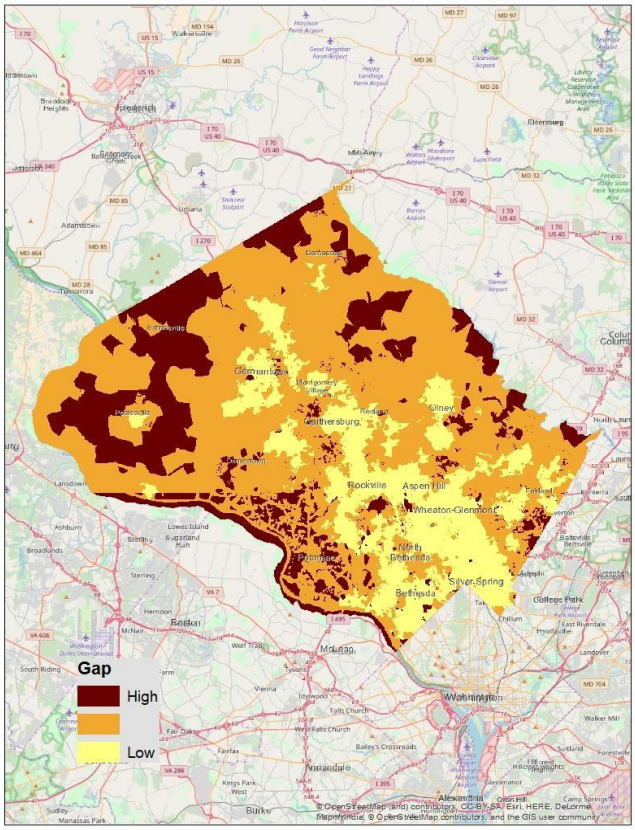

Figure 1: Set One Gap Analysis Results

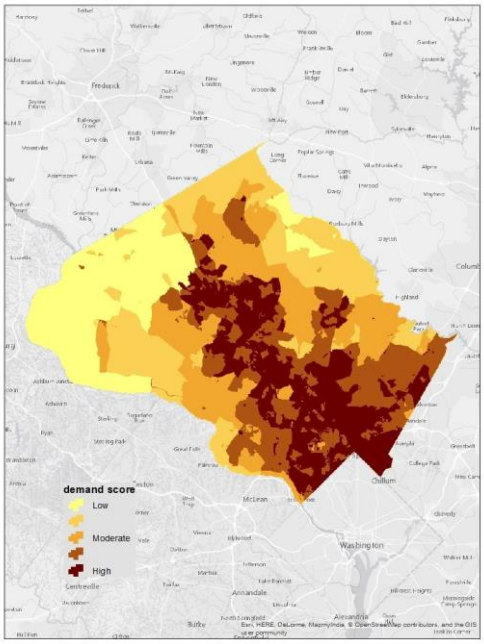

Figure 2: Set Two Supply Score

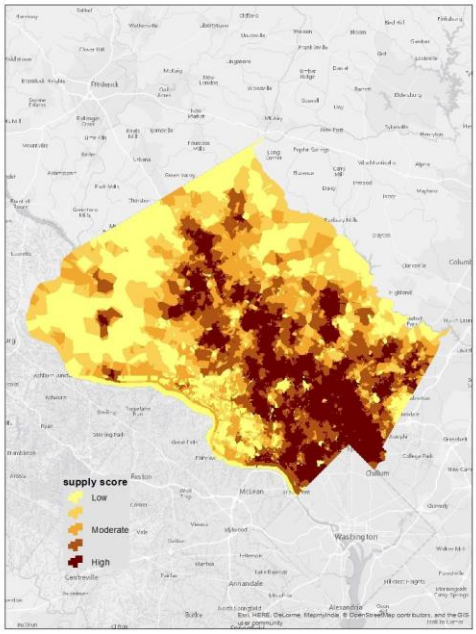

Figure 3: Set Two Demand Score

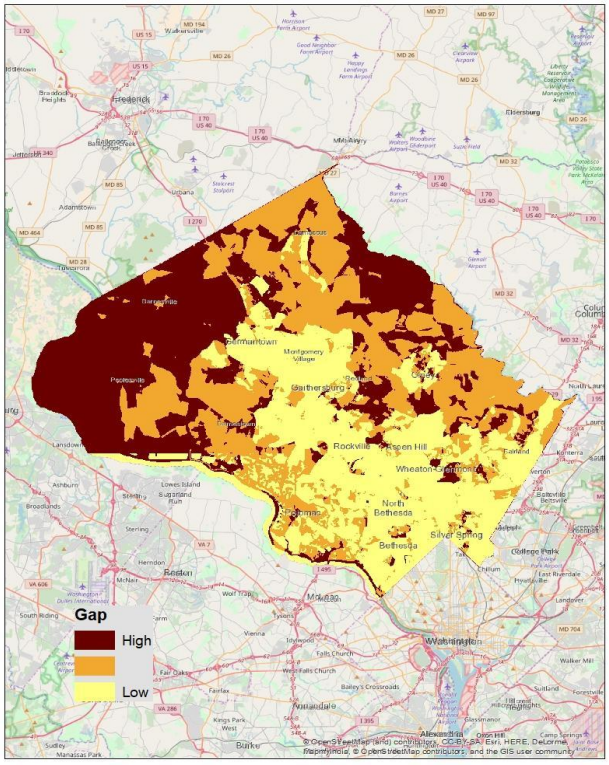

Figure 4: Set Two Gap Analysis Results

However, the Set 2 results, in Figure 4, depict a much greater contrast between high and low gaps in the supply of parks throughout the County. Low gaps show high supply of parks relative to demand throughout the I-270 area, as well as surrounding the Beltway and within the Burtonsville area. High gaps show a need for parks across the County's rural and northwestern section in Poolesville, Barnesville, and southeast of Damascus near Laytonsville.

While Set 1 and Set 2 results show differing levels of contrast between areas of low and high gaps in the supply of parks, both suggest an unmet demand for parks in more rural northwestern Montgomery County around Poolesville, and in areas southeast of Damascus and toward the northeastern border of the County.

Brief Recommendations

Going forward with this project, we recommend examining a greater number of variables. It would be useful to examine how each variable impacts the final demand score, which could be done by simply removing a variable and seeing how the demand score fluctuates without it. Understanding how each individual variable impacts the demand score would be useful, allowing M-NCPPC and DoE to see which variables have the most significant impact on the composite demand score. It would offer the possibility of applying weights to variables according to how relevant they are to park demand. We also recommended that more variables relevant to park use be included in the demand scoring.

A useful tool for the M-NCPPC and DoE would also be to test "what-if" scenarios. For example, if a new park was placed in the town of Poolesville, what would it's impact be on the demand in the area? Using this method would help located parks where they would have the greatest impact on the supply-demand gap. Instead of just adding parks in areas with the appearance of more demand, parks could be located where they would have the most impact.

It would also be useful to test the "ground truth" of the existing data. Confirming that there are parks where the data says that there are, and that these are the only parks, would improve research accuracy. Along with confirming the data's accuracy, public awareness of existing parks could be a worthwhile study. If the goal is to ensure that parks are serving as many people as possible, ensuring that the public is aware of existing parks could be just as useful as creating new parks.

Future Research

In the Spring 2018, PALS and the UMD, College Park Urban Studies and Planning program will again partner to continue research on this topic. The goal will be to provide a more in-depth analysis of the supply-demand gap. Improving the metrics of the analysis and using better, more precise data will aid in improving on the work done this semester. More advanced analysis tools, such as model-building, Python scripting, network analysis, and the use of spatial statistics, will help to make the research more accurate.

Appendix

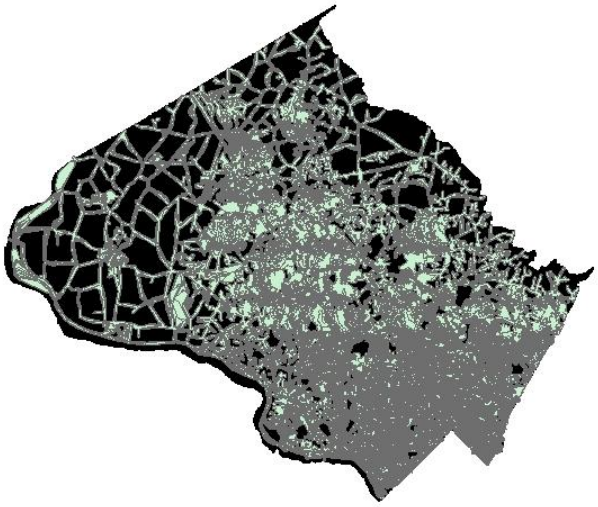

Figure 5: Final Walkshed Outline Layer