GROWING DORCHESTER’S COMMUNITY GARDENS

A SUITABILITY ANALYSIS OF DND-OWNOWNED PROPERTIES IN DORCHESTER, MA

BACKGROUND

Community gardens serve a vital role to communities—especially in urban areas. According to the City of Boston, “Community gardening is an opportunity to learn about growing food, to take stewardship of common land, and become involved with and build your community.” (City of Boston, 2016). While access to community gardens is important in all communities, their ability to produce fresh, healthy produce for households and at large can have significant economic and health benefits for low-income and marginalized households.

Dorchester is the largest neighborhood in the City of Boston, and has over 100,000 residents and a median household income of less than $45,000, below the City’s median household income of $56,000 (2010-2014 ACS). Currently, there are 31 community gardens located throughout the neighborhood, however because of the neighborhood’s size, there is the potential to expand the neighborhood’s community garden capacity. The City of Boston’s Department of Neighborhood Development owns properties throughout Boston, including in Dorchester. Since these properties are already owned by the City and are currently not in use, they have the potential to be used as community garden sites. This project analyzes the suitability of DND-owned properties throughout Boston based on environmental factors that impact the health impacts of particular locations, as well as proximity measures to existing sources of fresh, local product, and demographic characteristics should be considered. Sites are scored based on their proximity to existing community gardens, summer farmers’ markets, and high-speed roads, as well as the population density, density of SNAP recipient households, and land use.

METHODS

This project uses similar analysis methodologies to a study by Macchiarolo, Elwood, and Berg on suitable sites for urban agriculture in Springfield, MA in its rasterizing and reclassification of data layers based on suitability parameters.

Tier 1 Suitability Analysis

Regardless of suitability based on the features included in the analysis, not all DND-owned properties in Dorchester would be suitable for a community garden. To limit the property inventory to possible garden sites were eliminated from the potential property inventory if they contained a building and if they were considered too small or too large for a garden—either less than 6,000 square feet or greater than 63,000 square feet.

Tier 2 Suitability Analysis

To determine which DND-owned properties would be most suitable for a community garden each of the six main datasets were scored from 0 (low) to 4 (high). To analyze the datasets based on proximity—community gardens, farmers’ markets, and roads—Euclidean distances were calculated from the gardens, markets, and high-speed roads. These distances were then recalculated on the scale of 0 to 4 based on their suitability for a garden. While the resulting scores were the same, the distances that they represented varied. Community gardens included the least amount of distance, based on the assumption that people would not want to travel more than 1,000m from their home to a community garden. Farmers’ markets had a distance twice that of community gardens, as people were willing to travel a further distance to a farmers’ market once they may travel less than 0.5km and may travel more of transportation aid from walking. The high-speed roads covered the greatest distance, based on recent public health studies in Boston indicating that living or spending significant time in 100m of high-speed roads can have significant and long-term health impacts. For each of these scores the greater the distance from the feature of interest the more suitable the feature is for a community garden.

The land use dataset was rasterized, similar to the other datasets and was recalculated with the same 0-4 scale range on the suitability of different land uses for a garden. For instance, transportation and waste land uses were given a score of 0, while medium density land was given a score of 3 and urban-open and high density residential were given a score of 4.

The American Community Survey data on population and food stamp recipient the density of residents and households receiving food stamps per 1,000 persons were calculated and recalculated with the same 0-4 scale. Areas with higher population densities were viewed as more suitable for a garden as they could serve more people, while areas with higher food stamp densities because they could benefit more low income families with limited food spending budgets.

Once each of the datasets was scored, they were weighted and combined to calculate an overall suitability score. Prior to existing community gardens and land use were received a weight of 2, population density and proximity to high-speed roads received a weight of 2, and proximity to farmers’ markets and food stamp density received a score of 1.

RESULTS

This suitability analysis produced scores ranging from 0.02 (low) to 5.16 (high). The table highlights three of the highest scoring DND-owned properties. Although the resulting scores are similar, there are variations in the individual scores, especially due to the weighting of the different suitability factors. Of the DND-owned properties, property A, on the overall suitability map receives a score of 3.58, the highest of all of the properties. This property received a score across the table of 3, 2, 3, and 3, respectively. Property B is another property with high suitability scores—scores of 3.5 and 4.3. As a result of the weight properties B and C actually have higher scores for population density and property A, but have lower scores in other categories.

Median Household income was a factor that was not included in the analysis, as food stamp recipient households were used to indicate financial need. All three of these properties fell within the highest category of SNAP Household density, but when median household income is included it is clear that there is a significant variation in income.

SHORTCOMINGS OF ANALYSIS

It is very possible that this suitability analysis may not be realistic the most suitable plots of land. One of the main challenges is the age of the datasets; the datasets on Boston’s Farmers’ Markets and Community Gardens are from 2013 and the Land Use dataset is from 2011. The growth of food systems initiatives in Boston, as well as changes in land use over the past decade-plus could make these datasets outdated. Additionally, a shortcoming of the Land Use dataset is the manner in which land is classified generating parcel of land that are at or near an acre in size, leading to the potential for overestimation or underestimation of land uses. The American Community Survey, which provides data on residential population and food stamp recipients may also over-estimate or under-estimate the population since only a small fraction of the nation is included in the states. Finally, it is important to note that this analysis did not include some features that are necessary for locating a community garden—access to water, sunlight, general community interest, etc. It is not possible to draw conclusions on the most ideal site for a community garden from the DND properties in Dorchester, but analysis can suggest which properties may be more suitable than others based on the given characteristics. This analysis could then be used for a deeper analysis with additional data layers and ground-truthing in Dorchester to identify the most suitable sizes.

DATA SOURCES

Community Gardens

Existing community gardens are used to highlight areas that are already served by community gardens and indicate areas that lack access to community gardens. The dataset was created by an individual using data on community gardens throughout Boston. The dataset is provided by the Mayor’s Office of Food Initiatives. This dataset provides coordinates for specific locations, so there is no issue of granularity. However, it is possible that the dataset may be outdated, since it was created in 2013 and the sustainable and food movement in Boston has grown since then.

Summer Farmers’ Markets

Summer farmers’ markets are used to highlight areas that are already served by farmers’ markets and indicate areas that may lack access to fresh, locally grown food. The dataset was collected by the Mayor’s Office of Food Initiatives using data on the farmers’ markets throughout Boston. This dataset provides the locations of farmers’ markets, so like the community gardens dataset the issue is not of granularity but rather the potential for being outstayed since it was created in 2013.

2005 Land Use

Land use from 2005 can be used to determine the suitability of plots of land based on its fairly granular land use. The dataset was created by MassGIS by analyzing cadastral imagery and classifying land based on its use on a 36 class land use system, comparing (and use in 2005 to land use in 1990). This dataset presents the challenge of both over-estimation and under-estimation because land may be reclassified due to human error in the classifying process, as well as the scale of analysis since area that is largely but not entirely a single land use may be classified as the land use making up the majority, leasing the majority usage.

Department of Neighborhood Development Properties

The inventory of properties owned by the DND can be analyzed based on their suitability for a community garden by filtering the inventory by neighborhood, use, and property type and scoring based on suitability. This dataset was created by an individual community member based on an inventory of city-owned property and managed by the Department of Neighborhood Development. This dataset presents the challenge of over-estimation because even if properties are filtered by their size and property type there may be other characteristics that make them less suitable for a community garden—such as challenges with accessing water or having a higher value use than a community garden.

American Community Survey (ACS)

The American Community Survey’s data on population count, food stamp recipients, and median household income can be depicted on the block group level. Areas with high population density and areas with a high number of food stamp recipients are more attractive for a community garden, and thus increase the suitability of plots of land in such block groups. This dataset was created by the U.S. Census Bureau from survey responses from the American Community Survey from 2010-2014 to provide demographic and socioeconomic information on the American population more regularly than the Census and with more detailed information. This dataset provides data at the block group level, which is less ideal than the block level as it spans larger geographies and it is not possible to identify whether block groups are rather uniform in their demographic characteristics or vary widely. Another challenge with the ACS data is that it only a small fraction of the population is surveyed, so it is possible that survey error results in the misrepresentation of communities.

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