Life is a Garden, Dig it!

A Replicable Suitability Score Model of Existing Community Gardens in the City of Cambridge, MA

Background

Why do community gardens matter?

- They increase access to affordable healthy foods.
- They improve the aesthetic and attractiveness of neighborhoods through providing recreational opportunities, preservation of ecological resources, and improved air quality.
- They create opportunities for community Development.
- They encourage civic agriculture that focuses on agricultural literacy; through engaging community members in learning about food production and becoming more aware of the overall food systems (Hou, 2009).

Decision making purpose:

- As community members and organizations realize the benefits of community gardens. It is expected that we will notice an increase in this type of development. For the purpose of increasing access to healthy and affordable foods in low income communities as well as to create civic agriculture educational centers.
- There are multiple factors that are crucial to the success and sustainability of community gardens. My model focuses on distance from other community gardens, access to bike paths, and density of population served.
- Ideally we would like community gardens not to be too close to other community gardens because we would like each garden to get the maximum foot traffic and resident participation. Community gardens need to be accessible to bicycle paths to ensure a way of transferring gardening tools as well as harvest. Besides the bicycle paths that I modeled allow for pedestrian use (walking and jogging).
- The aim of this pilot project is to create a replicable suitability score to evaluate the location of the 14 existing community gardens in the city of Cambridge, MA. I expect this tool to be helpful for other towns that are starting community gardens.

Table 1: Suitability score categories in detail

Data set (Figure #)	Category 4 (Best)	Category 3	Category 2	Category 1 (Neutral)
Community Gardens (1000 m) distance (Figure 1)	750 - 1000	500 - 750	250 - 500	0 - 250
Bike Path (500 m) Distance (Figure 2)	0 - 125	125 - 250	250- 375	375 - 500
Census Data Person per hectare (figure 3)	7105 - 13181	3861 – 7105	1390 - 3861	0 – 1390

Methodology

Describing the data sets used in the model:

- The Tiger 2010 census data to estimate population on the block level per hectare.
- Community garden locations data from the City of Cambridge.
- Massachusetts Department of Conservation and Recreation bicycle paths layer.

The spatial mechanism

- A prime location for a community garden would be far distance from neighboring community gardens (this model considers a 1000 m distance from another community garden to be ideal), and a walking distance from a bicycle path (this model considers within 500 m distance to be accessible to a bike path).
- In addition to that the location proximity to a densely Populated area (this model considers population density of 7105 -13181 individuals per hectare to be the most ideal location in terms of population density). Table 1 below details the findings of the models used to execute the spatial mechanism.

Models and GIS procedures:

- I relied on raster modeling spatial analysis tools to represent the spatial mechanism with Arc GIS.
- I used the Euclidean distance tool and reclassify tool to find out the locations within a 500 m from a bike path and a 1000 m of another community garden.
- I used the focal density tool and reclassify tool to create four classes of population density within the city of Cambridge, MA
- Finally I used the raster calculator tool to combine the findings from the three major datasets used in this model and to consolidate all the findings in one meaningful map.

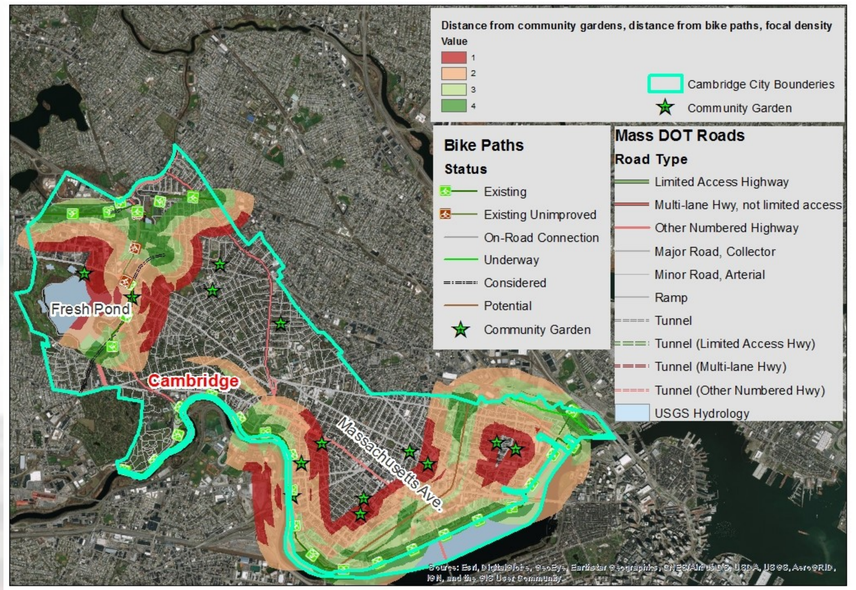

Figure 4: Prime locations for community gardens are represented by the category 4 (green areas). The classes were generated by using the raster calculator and deviding the results of the euclidian distance modelels and the focal density model by 3.

Figure 1: Community gardens. The buffers represent distance from each community garden for datailed reclass representation please look at Table 1.

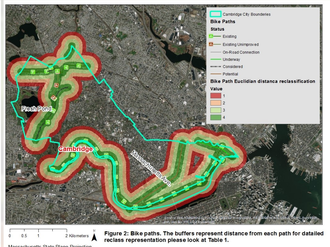

Figure 2: Bike paths. The buffers represent distance from each path for datailed reclass representation please look at Table 1.

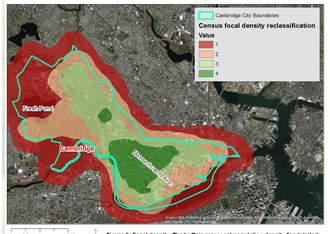

Figure 3: Focal density. The buffers represent population density for datailed reclass representation please look at Table 1.

Model Evaluation

When replicating the model, there are few things that we need to keep in mind:

- The demographic in the city of Cambridge is unique. Given there are two educational institutions (Harvard University and the Massachusetts Institute of Technology) this might include seasonal residents (residents who are not in Cambridge year around. Also we need to take into consideration that they might dine on campus therefore there is no desire and need for them to participate in a community garden program.)
- Besides dysfunctional sidewalks, the other things that will get in the way of residents who choose to walk is bodies of water, and potentially the schools property if for any reason they decide to stop public access.
- Limitations of this model include: The census data that are used in this model are from the year 2010 for a better estimate using the most updated census data can be helpful. The bike paths layer is generated and used for conservation purposes, using a bike path data set that is used for urban commuting might provide us with better estimates.

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May 5, 2018

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Sources:

Hou, Jeffrey, Johnson, Julie, & Lawson, Laura J. (2009). Greening cities, growing communities : Learning from Seattle's urban community gardens (Case study in land and community design). Washington, D.C.: Landscape Architecture Foundation in association with University of Washington Press, Seattle & London.

Bicycle Trails, September 2004, Mass. Dept. of Conservation and Recreation, published by MassGIS, accessed on May 2018 at https://docs.digital.mass.gov/dataset/massgis-data-bicycle-trails.

Census Blocks/ population: US Census Bureau, 2010, accessed May 2018 at https://www.census.gov/geo/maps-data/data/tiger-line.html.

Community Garden, January 2016, Published by the City of Cambridge, accessed on May 2018 at https://www.cambridgema.gov/GIS/gisdatadictionary/Recreation/RECREATION_CommunityGardens.

Mass DEP Hydrography, March 2010, USGS; Published by MassGIS, accessed May 2018 at https://docs.digital.mass.gov/dataset/massgis-data-massdep-hydrography-125000.

Mass DOT Roads, June 2014, Mass Dept. of Transportation; Published by MassGIS, accessed May 2018 at https://docs.digital.mass.gov/dataset/massgis-data-massachusetts-department-transportation-massdot-roads.

Town Boundaries, February 2014, Mass Dept. of Public Works; published by MassGIS, accessed May 2018 at https://docs.digital.mass.gov/dataset/massgis-data-community-boundaries-towns.