Decreasing Landfill Volume by Encouraging Composting:

Demonstrating suitable areas for community compost piles in Somerville, MA

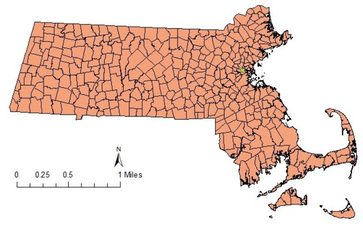
INTRODUCTION

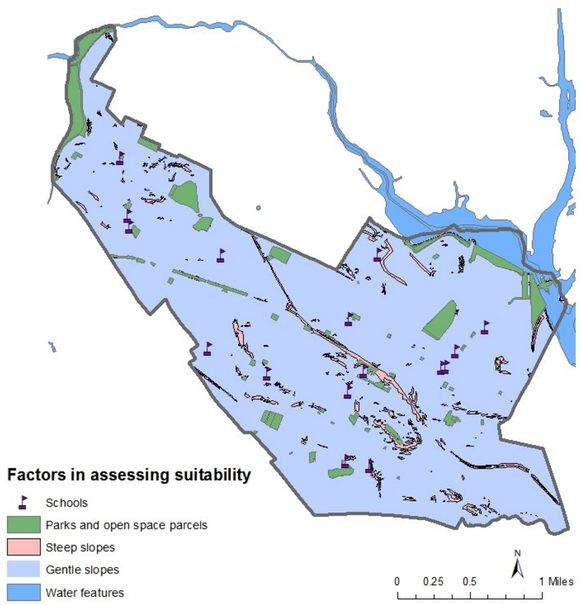
A large amount of the waste in municipal solid waste (MSW) landfills is compostable material. With all the volume occupied by compostable waste, landfills have a shorter active lifespan and new landfills have to be created. This can lead to the destruction of wildlife habit and the decrease of the quality of life for people who live around new landfills. Furthermore, anaerobic conditions within landfills cause organic compostable materials to help produce methane, a greenhouse gas that can be detrimental to the environment if not monitored and collected properly. Because of these factors, it stands to reason that we should work to reduce the amount of compostable materials in our MSW landfills.

While not all the compostable waste in landfills is food, overall trash volume could be greatly reduced if households composted their food waste. In areas that are urban and densely populated, it is not realistic to expect everyone to have a personal compost in their backyard. One way to make composting easier for these urban dwellers would be to create community compost piles where residents could go to drop off compost.

As an example of where to place community compost bins in an urban, residential areas, a suitability analysis was conducted in Somerville, Massachusetts. The aim of this study is to demonstrate the feasibility of starting community compost piles in urban environments and to take into account the most basic factors when making a compost pile to show suitable areas within Somerville.

Location of Somerville within Massachusetts





METHODOLOGY

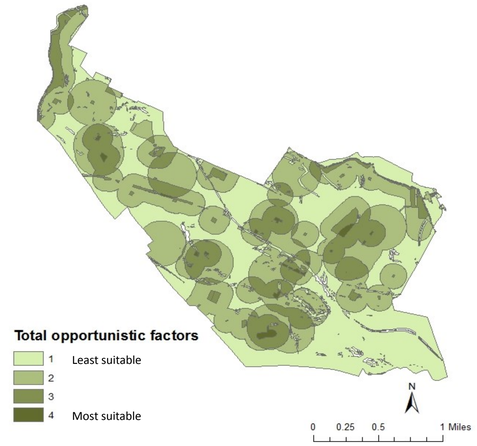
All necessary data for this analysis was available through Mass GIS and Tufts University. The data was clipped or masked to the Somerville area.

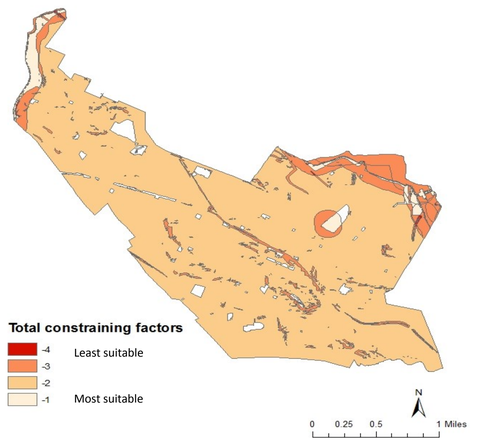
Areas that were counted as opportune for a compost pile were: within 500 feet of a school or park, on a surface with a gentle slope (no more than 10 degrees), and on an open space parcel. The proximity to schools and parks was to allow for the greatest possibility of community involvement in the composting process, and the slope and open space factors relate to the likely success of a compost pile in that area.

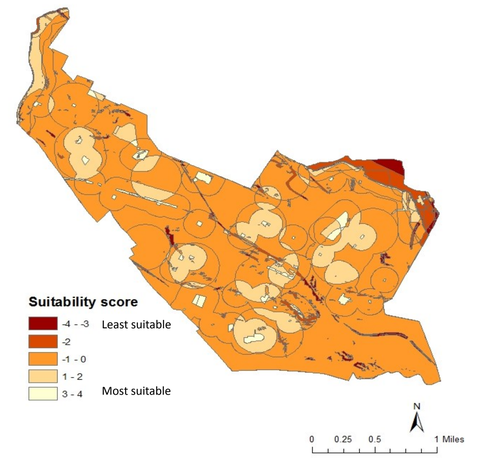
Areas that were counted as having constraining factors for a compost pile were: within 500 feet of a body of water, on a surface with a very steep slope (greater than 10 degrees), and on a parcel that is not open space.

The buffer tool was used to determine areas with the specified proximity to schools, parks, and water features. To determine which areas would be too steep to accommodate a compost pile, the slope tool was used. This layer was then converted to a shape file and steep and gentle slope layers were created by selecting by attribute.

Constraining features were given a value of -1, except for non-open space parcels, which were given a value of -2. All opportunity factors were given a value of +1. Composite maps to show total opportunities and total constraints in an area were created using the union tool. To fully visualize which areas would be suitable for compost bins, the composite opportunity and constraint maps were also joined using the union tool, and the total negative factors were added to the total positive factors. Areas with the highest possible values (3-4) could be assumed to have no constraining factors present and were selected as either the most suitable (having a score of 4) or acceptable (having a score of 3).

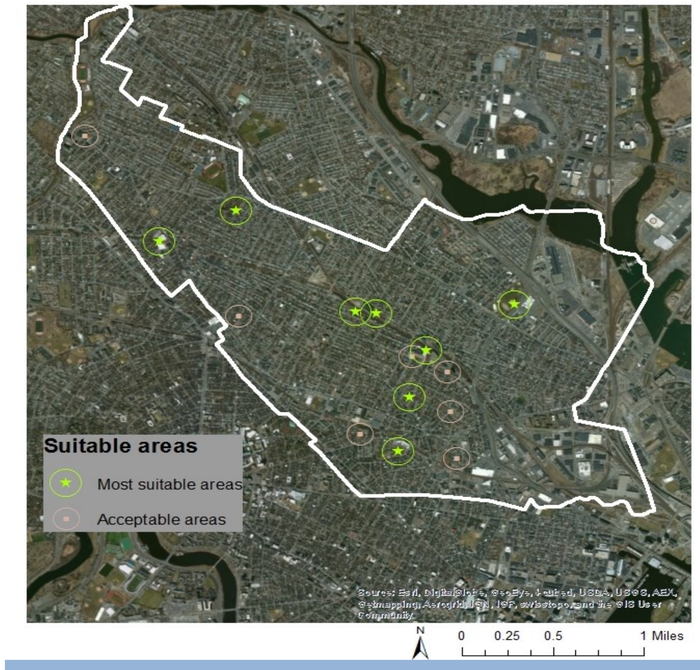






RESULTS

Several areas were found with a suitability score between 3-4. Scores of 4 are the most suitable because there is no possibility of a constraining factor within that area. However, even within these highly suitable areas there were problems comparing the suitability map to an aerial image. Some highly scored areas were located on very developed land, such as playgrounds, tennis courts, or athletic fields. In some cases, there were still areas within that parcel that were visibly suitable for a compost pile, but in other cases the entire area was unsuitable and was omitted. Any area with a score of less than 3 was not considered suitable due to the possibility of more than one constraining factor.



CONCLUSIONS

Despite the problems encountered with land use, this analysis showed that there are many suitable locations for community compost piles, even in developed areas like Somerville. This shows that it would be feasible to implement a community composting system. In order to start such a program, a similar analysis should be conducted with greater attention paid to land use, so that no problems occur with existing infrastructure. Additionally, community involvement is the most important part of making such a program run. Education should start in schools to encourage composting, and existing environmental organizations such as Groundwork Somerville should be enlisted to help.

REFERENCES

Toby Crispin | April 29, 2013 | Intro to GIS

Professor: Carl Zimmerman; **TA:** Carolyn Talmadge

Data Sources: Mass GIS 2010, Tufts University ESRI

Projection: NAD_1983_StatePlane_Massachusetts_Mainland_FIPS_2001_Feet

Scale: 1:20,000

Tufts