Farm Hunting: Suitable Cropland and Orchard Parcels in Harvard, MA

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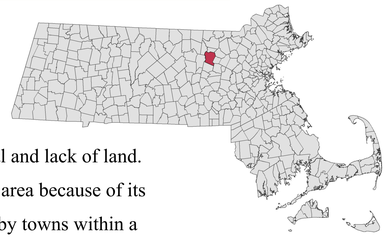
Fundamentals of GIS, NUTR 231, Fall 2017

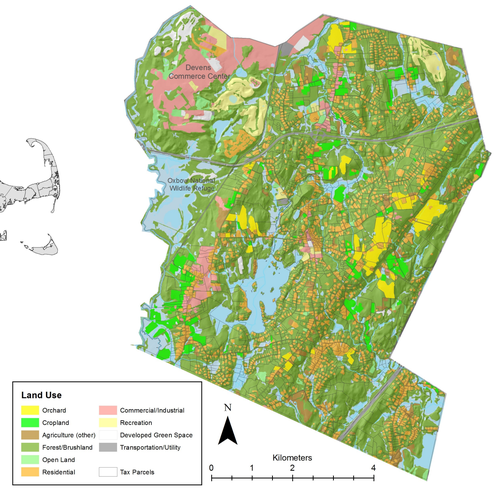
Introduction



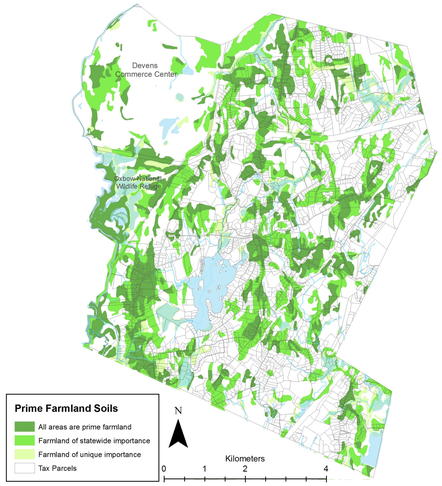
Across the country, the average age of farmers is increasing into retirement age, with very few new and younger farmers to replace them. The greatest barriers for people who want to start a farming business are lack of capital and lack of land. Harvard, Massachusetts was chosen for this pilot area because of its relatively low land prices compared to other nearby towns within a reasonable radius of the Boston Metropolitan area. To further mitigate other barriers, Harvard, MA has a robust farm economy with infrastructure, land, and markets already established for both crops and orchard products.

The purpose of this project is to use GIS techniques to map where suitable parcels for cropland and orchards are located. I chose two parcels from each final suitability analysis to highlight the range of properties that exist as well as to illustrate how my model aligns with current aerial photography data. I was able to access up-to-date tax assessor's data in order to provide the total value of each selected parcel as well as information regarding the existing structures, where appropriate. The goal of this project is to create a replicable GIS model that allows people to find land parcels that would be most suitable for starting a successful farming business.

Land Use (2005)



Prime Farmland Soils



Methodology

To create my final suitability maps, I used the most recent land use data (2005), prime farmland soils data, and elevation data to examine slope and aspect. I created separate models for cropland and orchard suitability because of the slightly different conditions that are ideal for each. For both models, I used a ranking system from 0-3, with 3 being the "best" condition and 0 being "unsuitable". I gave existing cropland and orchards a ranking of 4 in order to give those areas extra positive weight. For cropland, I ranked pasture, open land, and nurseries as 3; very low-density residential as 2; brushland/successional as a 1; and everything else as 0. For orchards, I ranked cropland, pasture, open land, and nurseries as 3; very low-density residential as 2; brushland/successional as 1; and everything else as 0. For both cropland and orchards, I ranked all prime farmland soils and farmland of statewide importance as 3; and I ranked afrmland of unique importance as 2 because this type of soil refers primarily to land suitable for cranberries. I then used the elevation data to create a slope layer that I ranked separately for cropland and orchards. For cropland, I ranked a 0-3% gradient as 3; 3-8% as 2; 8-15% as 1; and everywhere above 15% as 0. For orchards, I gave 2-12% a heavier weight of 4; 0-2% as 3; 12-18% as 2; 18-25% as 1; and everywhere above 25% as 0. For orchards, I also used the elevation data to create an aspect layer. I ranked south-facing as 3; southeast and southwest as 2; and east, west, northeast, northwest, and north as 1. Since areas best suited for cropland are flat, I did not include aspect in my cropland suitability analysis. Finally, I only included parcels in my final suitability analysis that were at least 1 acre. For the highlighted parcels, I wanted to show some properties with existing structures and some vacant lots along with a variety of lot sizes and prices.

Conclusions

According to my model, there are 1,186 acres of suitable cropland and 1,485 acres of land suitable for orchards in Harvard, MA. Many of these acres overlap with one another because there are some conditions in my model that are suitable for both orchards and cropland. Even though I only depicted the "best" and "good alternative" locations, a few areas were deemed by my model as "okay" suitability, but they were not visible on the final suitability maps at this scale.

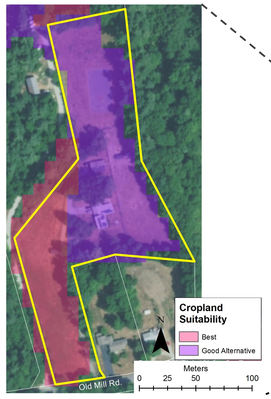
Overall, the data sets I used and the rankings I assigned to each condition produced a relatively strong model for assessing suitable land for growing crops and orchards. However, the rankings I used are most relevant in the northern hemisphere where south-facing slopes are ideal for agriculture. With more recent land use data, I would expect to see the most significant differences in how forested land has changed since 2005 as well as the new cropland and orchards that have been planted since then. These changes would likely increase the amount of land that my model deems suitable for crops and orchards. Increased commercial and residential areas since 2005 would likely decrease the amount of suitable land in other areas of Harvard.

This model can be taken forward to assess whether or not existing cropland and orchards are located in areas deemed unsuitable by the model, which I found in a few areas. More specific soils data, weather patterns, average temperatures, and pest range data could also be used in conjunction with this model in order to assess which specific crops would be most suitable in each location. The rankings I gave each data set can also be altered in order to accommodate different requirements.

58 Old Mill Rd., Harvard, MA

5.6 Acres — Valued at $505,200

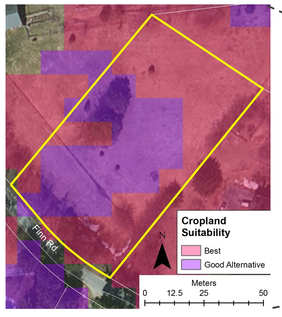
The slope of this parcel ranges from a 0.5% to 4.5% gradient on former cropland and very low density residential land. Nearly the entire 5.6 acres is suitable for cropland. The property includes a one-story Raised Ranch-style home built in 1967 and valued at $224,400. This would be ideal location for someone looking to start a new farm producing high-value crops.



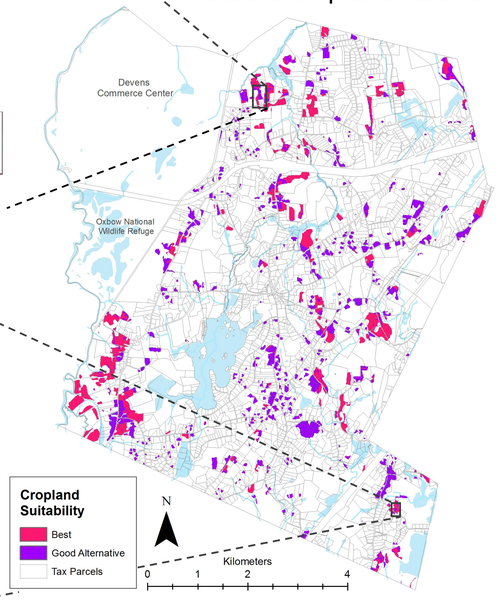
21 Finn Rd., Harvard, MA

1.5 Acres — Valued at $195,000

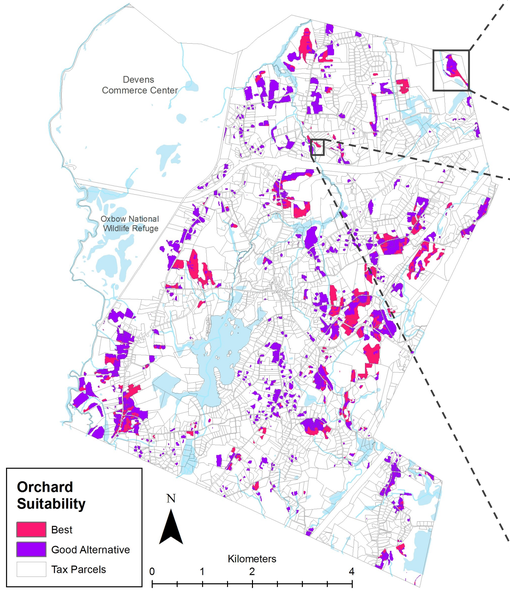
This property is generally flat, with the steepest slope at any point being about 7%. The entirety of this vacant lot is suitable for cropland. This location would be great for a beginning farmer looking to start their business on a small plot, with the potential for scaling up in the future.

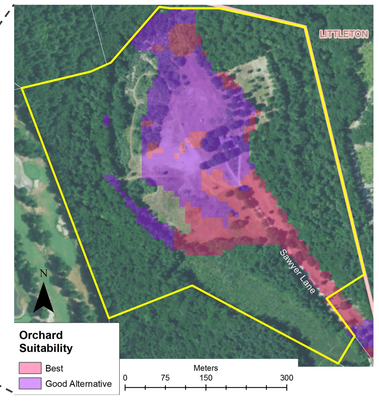


Suitable Cropland Parcels



Suitable Orchard Parcels

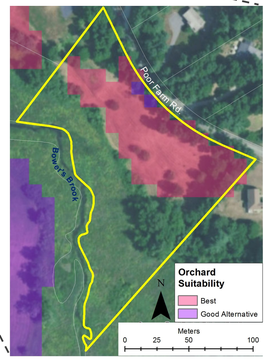




60 Sawyer Ln., Harvard, MA

66.8 Acres — Valued at $715,600

This large property varies from roughly a 1% gradient slope to a 12% slope in a few places. The slopes on this property vary from east to south to west-facing. Of the 66.8 acres, 20.7 acres are deemed suitable for orchards, with the rest of the property primarily forested. The property includes an 8-room, 1.5 story Antique-style home built in 1900 valued at $241,700.



Poor Farm Rd., Harvard, MA

4.8 Acres — Valued at $35,500

The southwest facing slope of this property has a gentle gradient of 0 to 7%, with 1.7 acres of land suitable for orchards. The rest of the parcel is non-forested wetland along Bower's Brook. This would be the perfect location for a beginning farmer looking to start their own fruit-tree business.

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