A site suitability analysis like this one would support efforts to promote new, small-scale, sustainable farms in the state of Vermont. Across the U.S., agriculture has become industrialized, with large-scale operations producing our food on larger and more specialized farms. One reason for this trend is that farmers are receiving a smaller and smaller portion of the consumer’s dollar as wholesalers and retailers take control over the distribution and marketing of our food.

There has been a backlash against this industrialization over the last few decades as Americans take back control over how, where, and by whom their food is produced. Small-scale farmers are often better land stewards and tend to be focused on quality rather than quantity of production. Small-scale operations can be more profitable with a direct-to-consumer marketing system—selling products on or more of the farmers’ markets or cooperatives across the state. This way, farmers capture 100% of the consumer’s dollar, and consumers can connect with the people growing their food.

In 2005 Vermont had:
- 8,300 farms
- 1.25 million acres of land in farms
- (23% of total land area)
- 62 active farmers markets

In 2002:
- Average age of principal operator was 54
- 1,143 farms were selling direct to consumers
- 179 farms sold certified organic commodities
- 261 farms had land in orchards
- 1,723 farms had tapped maple trees
- 413 farms sold vegetables & melons

Vermont’s top products:
- Dairy, maple syrup, Christmas trees, apples

In 2002:
- Vermont Department of Agriculture

Site Suitability Analysis for Agricultural Operations in Vermont: A demonstration of the “weighted overlay” raster analysis technique

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**Methodology**

1. Collected data layers – raster if available
2. Merged soil classification data tiles (which were by county) into a single layer file
3. Converted all vector format files to raster format
4. Resampled all 30m cell-size raster files to 30m cell-size so that file size was manageable
5. Used spatial analysis to create a kernel density map from census block population data
6. Used spatial analysis to create a distance from major roads map
7. Reclassed all input layers into integer values on a scale of 1-9
8. Performed a weighted overlay raster analysis, with the following weighting:

<table>
<thead>
<tr>
<th>Weighting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>soil classfication</td>
</tr>
<tr>
<td>20%</td>
<td>land cover/land use</td>
</tr>
<tr>
<td>10%</td>
<td>distance to population centers</td>
</tr>
<tr>
<td>10%</td>
<td>distance to major roads</td>
</tr>
<tr>
<td>0%</td>
<td>public conservation land (binary variable)</td>
</tr>
</tbody>
</table>

**Input Maps**

- **Public Conservation Land**
- **Population Density**
- **Soils Classification**
- **Major Roads**
- **Prime Agricultural Soils**

**Input Rationale**

- **Soils Classification**: The NRCS has identified and mapped “prime” agricultural soils, soils of “statewide” importance, and soils of “local” importance. The NRCS considered soil composition and texture, moisture level, slope, aspect, and temperature.
- **Population Density**: The NRCS used a hydrological analysis.
- **Access to Major Roads**: I considered proximity to major roadways to be a desirable factor in site suitability. This assumes that the producer would aim to sell directly to consumers at farmers’ markets or cooperatives in city and town centers.
- **Land Cover/Land Use**: Any land that has been classified as wet, barren, or developed was excluded from potential sites. Land currently classified as “open” or agricultural received the highest ranking and forested land received a lower ranking due to the cost of clearing brush or trees prior to cultivation.

**Challenges**

I wanted to include a land value variable, to give preference to more affordable land, but had difficulty finding anything meaningful. The USDA has data on the average value per acre of current agricultural land and buildings, but this is only at the county level. The U.S. Census has median home value by town, but this doesn’t take undeveloped land into account. I was also hoping to geocode farmers’ market locations across the state, because proximity to a direct-to-consumer market would be very desirable for a small-scale farm. But the Vermont Agency of Agriculture, Food & Markets doesn’t provide true addresses for the existing 62 markets. Finally, a professional investigation of site suitability for new farms would use a complete network analysis if proximity to major roads was a factor. I strictly used Euclidian distance.

**New Farm Site Suitability**