Blueberries in the Valley of Sorrows

Ideal Locations to Grow Highbush Blueberries in Armenia

Introduction

Armenia struggles with high rates of rural unemployment, with the main sources of employment in villages being agricultural work. Armenians also take great pride in the high quality of their fruits and vegetables, growing a diverse range of produce in a country roughly the size of Maryland. Despite generally favorable growing conditions in much of the country, however, blueberries have rarely been grown. The opportunity is ripe to introduce this crop to support rural economies!

Methodology

Suitability Analysis

I judged suitable areas for cultivating highbush blueberries in Armenia by soil type, land cover, precipitation, clear days, and slope, and classified these raster data for blueberry suitability. To test the sensitivity and validity of my model I created a weighted overlay with different weights for each of the five input layers. Finally, with raster calculator I assigned a final value to each cell within the country summarizing its suitability for blueberry cultivation.

To address this shortcoming, I drew twenty kilometer buffers around the centroid of each significant market polygon. This is obviously not as accurate a picture of travel times as a network analysis, but I feel it still provides an adequate picture of different areas’ access to markets.

Network Analysis

Using Open Street Map (OSM) data downloaded from an independent website, I created a network dataset of roads in Armenia, ranging from international highways to local unpaved tracks. I assigned each road section a base top speed according to its type, and divided this by a scaling factor according to province, to model steepness, windiness, and quality of road. I then created a layer of significant markets within Armenia, defined as the capital, regional capitals, and other regional secondary cities that I judged large enough from personal experience. Finally, with network analysis I attempted to draw service areas around these markets representing one hour of travel, to judge which promising areas for blueberries were near significant markets. Unfortunately, the service area tool never successfully worked.

To address this shortcoming, I drew twenty, kilometer buffers around the centroid of each significant market polygon. This is obviously not as accurate a picture of travel times as a network analysis, but I feel it still provides an adequate picture of different areas’ access to markets.

Research Questions

Where are the most promising locations in Armenia for growing highbush blueberries?

Of these areas, which are most accessible by the country’s road network to nearby significant markets?

Conclusions

The most promising areas to cultivate highbush blueberries close to significant markets in Armenia appear to be in various parts of Lori region or in northwestern Shirak region. However, it is important to bear in mind that cultivation of a cash crop such as blueberries could affect communities already using their land for staple crops. This method could also be used to analyze other fruit and vegetable cultivation suitability in Armenia.

Finally, to further improve spatial analyses in the region, NGOs, government bodies, and educational institutions in Armenia should prioritize developing and sharing better GIS data.

Results

Analysis of my analysis indicates that the most promising areas of Armenia to cultivate highbush blueberries is in the northern part of Yavatz Dzor region (whose name translates to “Valley of Sorrows”, hence the poster’s name). However, the terrain in this region is rugged and the roads rough, and the disunted border with Azerbaijan looms. The southeastern section of Gegharkunik region is similarly risky for longterm cultivation. Southwestern Syunik region also shows promise, but the roads in this area are notoriously difficult to navigate. Likewise, the promising area at the intersection of Gegharkunik, Kotayk, and Ararat regions is an extremely mountainous and rugged area. Taking into account Armenia’s road network, topography, and geopolitical situation, it would likely be more promising to cultivate blueberries in Lori region or in northwestern Shirak region, further from a major market, but still accessible because of relatively flat and straight roads.

Limitations

The literature stresses the importance of finely detailed soil data, including such factors as pH and drainage. I was not able to find such specific variables, but in some cases was able to proxy for them, for instance by using slope to approximate drainage. Additionally, the public-available GIS data for Armenia are generally out of date and insufficiently granular; the soils data, for instance, are from the Soviet era and in some cases show large sections of a region as one uniform soil type.

Additionally, the buffer method used to determine market accessibility due to the failure of the service area tool will not sufficiently capture steepness, terrains, and quality of roads in different regions of Armenia. However, given the approximate nature of this analysis, I still feel that this method displays access to significant markets adequately enough.

Sources

Blueberries in Armenia

Suitability for Blueberries

<table>
<thead>
<tr>
<th>1 - 3 (Lowest)</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10 (Highest)</th>
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Market Access

- Significant Markets
- Area Within 20 km of Significant Market
- Significant Roads
- Regions of Armenia

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