

Solar Panel Initiative

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Introduction

Due to increased global temperatures and pollution, there is a growing need for clean energy sources. This project explores a fictitious government solution that includes:

- An initiative meant to generate renewable, solar energy for the southwestern United States.
- Requires residents within specific counties to put solar panels on their roofs.

Data

Acquired Data:

- US Generalized Counties
- 2010 Temperature Raster
- Historical Climate Data
- 2010 County Census Data
- NAIP Imagery of Phoenix, AZ

Methods

Selection Criteria for County and City Data:

1. Selected By Attribute Within "Counties" Shapefile
 - Median Household Income > \$45,000
 - Created new layer from selection
2. Selected By Attribute within "Cities" Shapefile
 - Average, Annual Temperature < 70
 - Mean, Annual Clear Days > 170
 - Mean, Annual Cloudy Days < 140
 - Created new shapefile from selection
3. Selected By Location using the New City Selection and County Selection Shapefiles
 - Select Counties that Contain the Cities Selection
 - Created new layer from selection
4. Rank the counties based on weighted parameters:
 - Weight rankings out of 100%
 - 1. Clear Days (70%)
 - 2. Average Temp (20%)
 - 3. Median Income (10%)

Weighted Index Equation (WIE) in Excel:

$$\Sigma (\text{Avg Annual Clear Days} * 0.7) + (\text{Avg Annual Temp} * 0.2) + (\text{Med Household Income} * 0.1)$$

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5. Based on rankings from WIE above (shown on map):
 - Performed Supervised Classification using NAIP Imagery.
 - Symbolized brightness levels by land types.

Results of Analysis

Resulting Counties Selection:

Clark	Kern	Maricopa	San Joaquin
Humboldt	Los Angeles	Placer	Santa Barbara

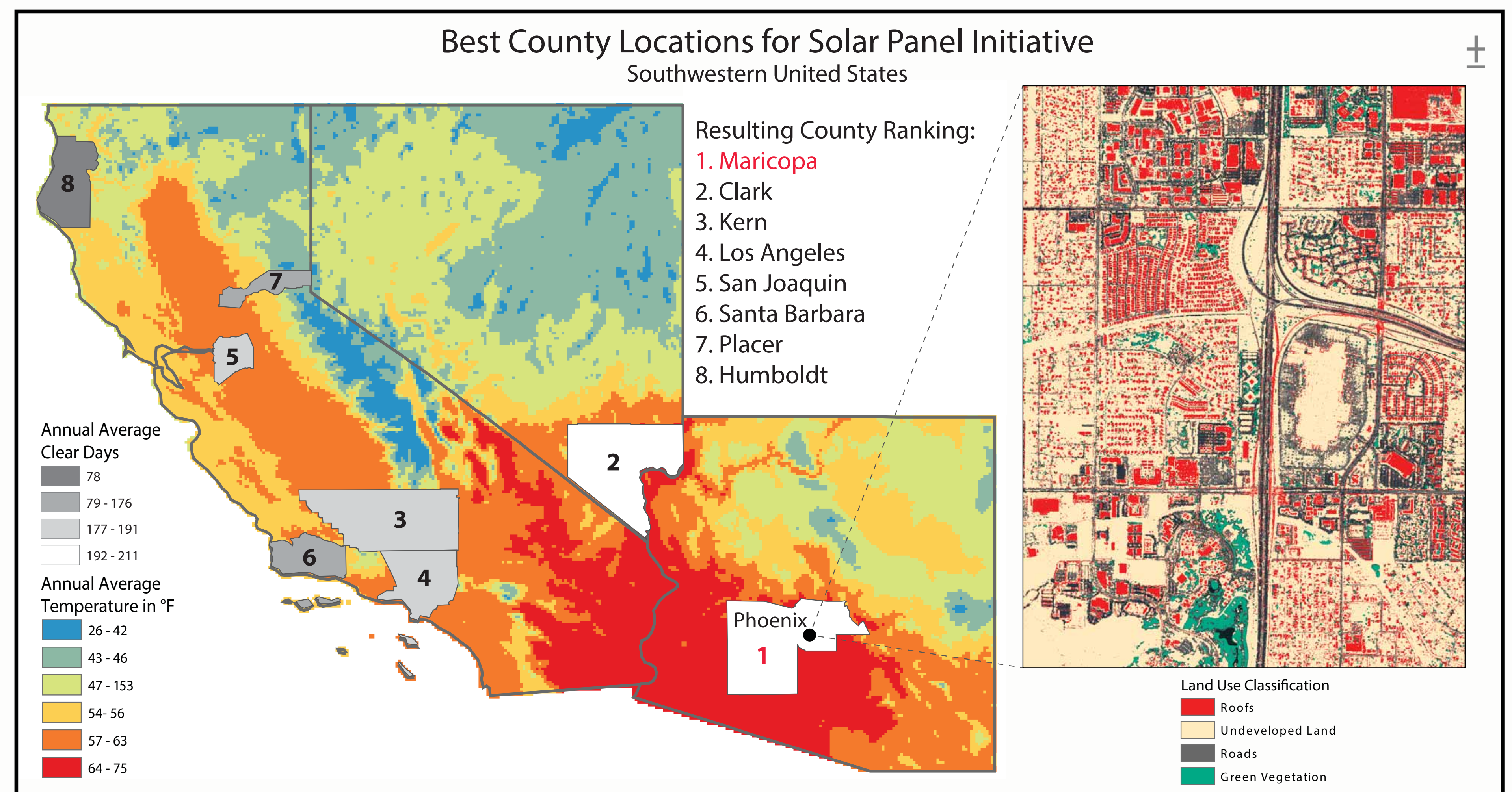


Figure 1. Map of analysis. Created by Adam Black and John Doolittle. 5/1/2014

Conclusion

- 8 counties qualify for the initiative.
- Maricopa was ranked first after our WIE.
- Our supervised classification showed us the available rooftops of a suburb in Phoenix, AZ.

Shortcomings:

- Lack of data (City points, weather data for all counties).
- Only Western United States was studied due to time constraints.
- Supervised Classification has limited accuracy.
- Time constraints did not allow us to analyze statistic of a Maximum Likelihood Classification.

Moving Forward:

- Could use all 3,144 counties of the United States for a larger analysis.
- Perform a Maximum Likelihood Classification to determine the percentage of available rooftops for solar panel installation.

References

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