Hiking Difficulty Along the Appalachian Trail

A vulnerability analysis of the Appalachian Mountain Range

Background

What is the Appalachian Trail?
The Appalachian Trail is a marked hiking trail along the Appalachian Mountain Range in the eastern United States extending from Springer Mountain in Georgia to Mount Katahdin in Maine. The trail is roughly 2200 miles long, though the true length is always changing as parts are added or removed. The trail is maintained by 31 trail clubs (primarily the Appalachian Mountain Club), and managed by the National Parks Service, the United States Forest Service, and the Appalachian Trail Conservancy. The Conservancy claims that the Appalachian Trail is the longest hiking trail in the world.

Objectives

The objective of this project was to identify regions along the Appalachian Trail that a particularly difficult and may require additional supplies or planning before they are attempted. This may give through-hikers (people hiking the entire trail) a better way to plan places to stop and re-supply along the trail. In these areas, help from a rescue team or emergency medical services can be many hours away even though the trail is maintained by 31 trail clubs.

Similar Studies

One study (A mixed-mode approach for estimating hiking on trails through diverse forest landscapes: the case of the Appalachian Trail) attempted to do something similar. In this study, the author estimates how long sections of the trail would take longer can also be interpreted as more difficult. For this project, any area with a slope greater than 15% was classified as a “high slope area.” This limited high slope areas to steeper mountain faces, most of which are among the tallest mountains on the trail. Analysis.

Difficulty Criteria

Individual layers were created based on different aspects of what makes a hike “difficult.” Each layer was converted into a raster data set, the raster data sets were then overlaid and added together to create a digitized map that would rank areas along the Appalachian Mountain Range based on the difficulty parameters.

Slope: Areas of high slope (going either up or down) make for a much more difficult hike as it requires more core and energy to get through these areas efficiently without injury. For this project, any area with a slope greater than 12,500,000 percent was classified as a “high slope area.” This limits high slope areas to stop mountain faces, most of which are among the tallest mountains on the trail.

Temperature: Colder areas are naturally more difficult to get through especially for through hikers or people who are camping on the trail. For this project, any area with a mean annual temperature less than 8 degrees Celsius was classified as a “cold area.” This limited cold areas primarily to the northeast, with some isolated pockets in the higher elevations of the southern portion.

Precipitation: More precipitation can lead to slippery conditions on the trail regardless of temperature. It can also affect visibility depending on the intensity of the storm. For this project, any area that receives more than 1508mm of precipitation annually was considered a “high precipitation area.”

Population: Areas with very low population density can make life very difficult for through hikers as it often means running out of food and water, and energy to get through these areas efficiently without injury. For this project, any area with a population density of less than 20 people per square mile was classified as “unpopulated.”

Elevation: Areas of high elevation make a hike difficult because the air is thinner, and exposure to elements is much greater. At higher elevations along the trail the wind is often gusting in excess of 50mph which can be very difficult and dangerous to hike through particularly on exposed ridges and cliffs. For this project, areas over 2700m in elevation were considered “high elevation areas.”

Methods

Scoring System

Each layer had a maximum value of 1 point, with five layers, this means that the most difficult areas would receive a score of five as they meet all of the aforementioned criteria. In other words, an area would receive a score equal to the number of criteria it met. In this analysis, all of the layers and criteria were equal. Therefore, an area can receive a score of two because it has a population density under 20 people per square mile, and a mean annual temperature under 8 degrees Celsius, while another area can receive a score of two because it receives more than 1508mm of precipitation annually and it is at an elevation over 2700m. Because of the scoring system, these two areas would be considered equally difficult, even though they are difficult for entirely different reasons.

Results and Limitations

The results show the remarkable variability in difficulty along the length of the trail. Assuming a hiker is moving from north to south (as most through-hikers do) they can expect to have a relatively difficult initial portion of the trail as they move out of Georgia, through North Carolina, and into Virginia; with many areas in this region receiving scores of 1, 2, or 3. As they continue north, there is a very large portion of the trail through Virginia, Maryland, Pennsylvania, New Jersey, and New York with a difficulty score of 0. This implies that this portion of the trail should go relatively quickly and smoothly. As they get into New England, the scores begin to increase with scores of 1 or 2 through Massachusetts and Vermont. As they make their way into the northernmost portion of the trail, the difficulty increases with the remainder of the trail receiving scores ranging from 2 to 5. This confirms that many through hikers would have asserted; that the portions of the trail in the White Mountains in New Hampshire and the 100 Mile Wilderness in Maine are the most difficult of the entire trail. These two locations are the only ones to receive a difficulty score of 5. There are several limitations with regards to the accuracy of this study. One limitation is that it is difficult to account for the time a non-trail hiker would attempt the trail. Very few people would attempt to hike the Appalachian Trail in a single season.

References


GIS: CEE – 187 Geographical Information Systems, Fall 2015

Cartography: North America Equalized Conic

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