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Designing Sustainable Landscapes: Slope settings variable

A project of the University of Massachusetts Landscape Ecology Lab

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With support from:

- North Atlantic Landscape Conservation Cooperative (US Fish and Wildlife Service, Northeast Region)
- Northeast Climate Science Center (USGS)
- University of Massachusetts, Amherst

Reference:

McGarigal K, Compton BW, Plunkett EB, DeLuca WV, and Grand J. 2017. Designing sustainable landscapes: slope settings variable. Report to the North Atlantic Conservation Cooperative, US Fish and Wildlife Service, Northeast Region.

General description

Slope is one of several ecological settings variables that collectively characterize the biophysical setting of each 30 m cell at a given point in time (McGarigal et al 2017). Slope gives the percent slope at each cell (**Fig. 1**). High slopes indicate a propensity for gravity-induced physical disturbance (e.g., talus slopes), which can limit plant development. Slope ranges from 0% for flat areas to theoretically infinity for absolutely vertical cliffs, though the actual maximum occurring in our landscape is 440%.

Use and interpretation of this layer

This ecological settings variable is used for the similarity and connectedness ecological integrity metrics.

This layer carries the following assumptions:

- The digital elevation model is accurate. Although this seems to be true at broader scales, the NED includes fine-scale rectilinear artifacts (see **Fig. 1**).
- Slopes at the scale of 30 m pixels are ecologically meaningful. Short slopes may be missed, and the actual slope of very steep cliffs may be inaccurate.

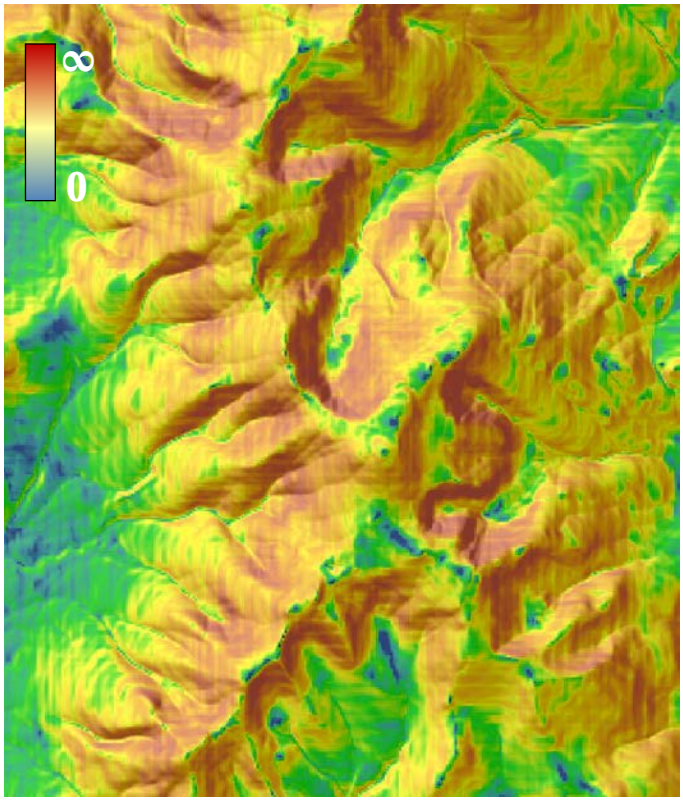

Figure 1. Percent slope (log-scaled for clearer display) for a portion of the Presidential Range, New Hampshire.

Derivation of this layer

Data source

- Digital elevation model (DEM). We used the National Elevation Dataset's (NED) 10 m DEM, resampled to 30 m.

Algorithm

Percent slope is simply 100 × rise/run for each cell.

GIS metadata

This data product is distributed as a geoTIFF raster (30 m cells). The cell values are continuous, representing percent slope. This data product can be found at McGarigal et al (2017).

Literature Cited

McGarigal K, Compton BW, Plunkett EB, DeLuca WV, and Grand J. 2017. Designing sustainable landscapes products, including technical documentation and data products. https://scholarworks.umass.edu/designing_sustainable_landscapes/