Suitability analysis

- Suitability value (rating): low -> high
- how suitable are different locations given a certain model and factors?
- Helps to make planning decisions, “condenses” spatial knowledge
- “granularity” of steps: integers (1) or floats (e.g., 0.1)
- the theoretical range (worst value to best value)
- 1 (worst) to 10 (best) or 1-100 or 0.0 to 1.00
- Fill all raster cells with suitability values (suitability raster)
- Suitability map: Show suitability in context

Today

- Suitability modeling in GIS
  - Reclassification
  - Weighted Overlay tool
  - Intro to Modelbuilder
  - Midterm next Tuesday (2:10 - 4)
  - HW 4 due next Tuesday

Suitability for placing a new facility

- Uses 5 colors to visualize suitability rating
- But: suitability could internally range from 1 to 10 or 1 to 100
Suitability is informed by two factors: population density and distances to Restaurants

- model: formula that (for each cell) combines multiple factors into a (final)suitability value (rating)
- Suitability of each cell is informed by:
  - distance to already available tacos (restaurants)
  - => locations (cells) with high distance values are good
  - => locations (cells) with low distance values are bad
  - and the population density
  - locations with high density values are good
  - locations with low density values are bad
- “Raw” data rasters for this area:
  - Dist: distance raster containing distances: 0 - 5000 m
  - Dens: density raster: 20 to 2000 people per square km
Reclassifying the raw data

- raw data (Dist: from 0 to 5000   Dens: 0 - 2000)
- cannot compare Dist directly to Dens
- Reclassify both to contain values from 1 to 10
- ReclDens = Dens / 500.0   ReclDist = Dist / 200.0
- the two reclassified raster are now comparable!
- Show Reclassified rasters with same color scheme
- Tool: Spatial Analyst Tools - Reclass - Reclassify

Weighted Sum of reclassed rasters

- Each reclassed raster (ReclDist and ReclDens) has values 1 - 10
- Each cell of the Suitability raster values
  - “Average” of ReclDist and ReclDens (at this cells location!)
  - Simple average: Suitability = (ReclDist + ReclDens) / 2.0
    - same weights for each “factor” here (equally important)
      - 50% Distance (weight is 0.5), 50% Density (0.5)
      - Suitability1 = ReclDist * 0.5 + ReclDens * 0.5
      - weight must always add to 1.0 (i.e. 100%)
  - different mix (now: Distance is more important!):
    - 75% Distance (weight is 0.71), 25% Density (0.25)
    - Suitability2 = ReclDist * 0.75 + ReclDens * 0.25
    - weights for: Density (much) more important than Distance?

Weighted Sum tool

- Calculates your Suitability rating (value)
- Spatial Analyst Tools - Overlay - Weighted Sum
- or: Raster calculator: Rcl_Dist * 0.75 + Rcl_Dens * 0.25
- if reclassed rasters’ values range from 1 to 10
- Weighted sum (with weights adding to 1.0) should (theoretically) also ranges from 1 - 10
- Convert to integer version with Int tool
  - Raster calculator: int(suitability_with_float_values)
- Advantage: area per suitability value via attribute table (VAT)

Lodge location suitability

- Suitability based on number of views and slope angle
- raw data (same as lodge planning data):
  - viewshed raster: 0 to 10 views
  - slope raster: 0 - 54.3 degrees
  - (distance to road raster: 0 - 9500 meters, use later?)
- Use Modelbuilder to reclassify raw data to 1 - 10
- mix using weighted sum with:
  - case 1: viewshed 50%, slope 50% both weights are 0.5
  - case 2: viewshed 75%, (0.75) slope 25% (0.25)
- color suitability raster Green - Yellow - Red
- visually compare both
- convert to int rasters, what’s the area of suitability values of 8 (5) or more?