Optional Assessment 4B: Tourism & Recreation in Andros Island, Bahamas

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The goal of this exercise is to understand which features of the natural and built environment are driving patterns of recreation and tourism along the coast of Andros Island, Bahamas. Andros Island is lightly populated, with limited development. The government of the Bahamas is interested to learn what attracts tourists to Andros, and how visitation rates may change if investments are made in infrastructure and in preserving the natural ecosystems. The first step is to understand the current relationship between the visitation rate and the characteristics of the natural and built environment along the coastline.

1) Start by generating a map of visitation rates across the Area of Interest (AOI). For the first model run we will not compute a regression.

- Launch the InVEST Recreation model and **define a workspace** for the model outputs
- Load the AOI shapefile (*andros_demo_aoi.shp*)
- Check **Grid AOI** and enter a **Cell Size** of 7000 meters
- Run the model

2) Load *pud_results.shp* into QGIS and symbolize the *PUD_YR_AVG* attribute with a graduated color scheme and "natural breaks".

- How many cells have 0 photo-user-days (PUD)? If it is more than half, the cell size may be too small for further modeling. If relatively few cells have 0 PUD, the cell size could be decreased in order to see more detailed patterns in visitation.
- Add the other GIS layers from the *sample_predictors* folder into the GIS and look for spatial relationships between those layers and the visitation patterns.
- Does the size of the grid cells seem appropriate for these predictor layers? Do some predictor layers have very high resolution compared to the cell size?

3) Go back to the InVEST Recreation model and set up a new run.

- Either **define a new workspace**, or add a **Results Suffix** to distinguish the results of this run from the previous one.
- Adjust the **Cell Size** based on your conclusions from Step 2.
- Run the model and repeat Step 2.

4) Once you have settled on an appropriate cell size, run the model again with the **Compute Regression** option. This fits a linear regression model that relates the predictor layers to the visitation rate.

- **Define a new workspace** for these new results.
- Set up the **predictors.csv table** (located in *sample_predictors* folder) with all of the predictor layers you wish to include. This table has the **path** column already complete. You should assign **id** names of your choice for each predictor as well as choose the appropriate **type** of metric to be calculated for each predictor. See below for details on completing this table.
- Leave the Scenario Predictor Table blank and the run the model.

Details on completing the **predictors.csv table:**

- **id** is a 10 character or less text string used to uniquely describe the predictor.
- **path** is the location and filename of a GIS layer. In this example, the files listed in the path column are located in the same folder as the predictors.csv file. GIS layers may be located in

other places, but the full path must be included in this table (e.g. "C:/Documents/Rec/airport.shp") or the path relative to the predictors.csv file.

- **type** must be one of the predictor metric modes described below.
    - *raster_mean*: Predictor is a raster. Metric is the mean of the non-nodata values of the raster that intersect the AOI grid cell or polygon.
    - *raster_sum*: Predictor is a raster. Metric is the sum of the non-nodata values of the raster that intersect the AOI grid cell or polygon.
    - *point_count*: Predictor is a point shapefile. Metric is the count of those points in each AOI grid cell or polygon.
    - *point_nearest_distance*: Predictor is a point shapefile. Metric is the Euclidean distance between the center of each AOI grid cell and the nearest point in this predictor layer.
    - *line_intersect_length*: Predictor is a line shapefile. Metric is the total length of the lines intersecting each AOI grid cell.
    - *polygon_area_coverage*: Predictor is a polygon shapefile. Metric is the area of overlap between the predictor and each AOI grid cell.
    - *polygon_percent_coverage*: Predictor is a polygon shapefile. Metric is the percent (0-100) of area of overlap between the predictor and each AOI grid cell.

5) Open the *regression_coefficients.txt* file and examine the results of your regression model.

- Do the **estimates** for each predictor make sense? Positive estimates mean that predictor is positively related to visitation and negative estimates mean the predictor is negatively related.
- Examine the size of the standard error (**stderr**) relative to the size of the **estimate**. The error describes the uncertainty around each estimate. Do any predictors have errors so large that the estimate may not be significantly different from zero?
- The **R-squared** value describes how well the model fits the visitation data. If R-squared is low, it may indicate that an important predictor is missing from the model. Is there a missing predictor layer that might help explain the visitation patterns?