DEM data

- Ultimate goal: convert to vector data that is easier to display on web map
    - Download the SRTM data from the USGS Earth Explorer
    - Mosaic the raster datasets into one single raster
    - Clip the DEM with the extent of Tuvalu in ArcGIS
    - Convert the DEM to points using **Raster to Point tool**
    - Create a fishnet (same extent, grid width, grid height, and coordinate system as the Tuvalu DEM; create polylines instead of polygons)
    - Select by location and polylines that are within 20 meters of the point layer
    - Use **editor tool (planarize lines)** to split and remove excessive polylines
    - Create polygons with values of the points using the **Feature to Polygon** tool
    - Use **select by location** to select those grids that intersect with the point layer
    - Convert the resulting feature class to geojson
    - Done!

Transportation data

- Download OSM data from https://download.geofabrik.de/ in pbf format
- Install the OsmConvert tool to convert the format of the data to XML
- Install ArcGIS Editor for OpenStreetMap and use the **Load OSM File** tool
- **Select by attribute** to create a new shapefile of all the highways
- **Intersect** the elevation grid and the highway shapefile
- Add a new field and calculate the length of highway segments
- **Dissolve** the result by grid id and sum the highway length in each grid
- **Join by attribute** to the original elevation grid

Food Security data

- **Select by attribute and export**: shapefile of farmland
- **Select by attribute and export**: shapefile of supermarket
- **Select by attribute and export**: shapefile of food-related amenities: restaurants, cafes, etc.
- **Spatial join** the shapefile of food-related amenities to the product of previous section (number of food-related amenities per grid)

Infrastructure

- **Select by attribute and export**: shapefile of buildings
- **Spatial join** the shapefile of buildings to the product of the previous section

How to find flooded areas with 1-meter SLR:

- Use python to analyze tide gauge data and calculate the MHHW
- **Select by attribute** to identify grid cells with elevation lower than 1 + MHHW
- **Dissolve** them into single-part polygons

- **Select by location**: select those polygons that are within the boundary of the islands and then invert the selection
- Create a new field in the grid data ‘bel_1_con’
- **Select by location**: select the grids that are within the selected polygons
- **Field calculator**: 1 for the selected grid cells and 0 for the rest (these are the flooded areas under 1 meter of SLR)