

## Lab 7a: Rainfall patterns and drainage density

This is the first of a four-part handout for class the two weeks after break.

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Due: 24 October in class.

Task: Download and prepare the datasets listed below so that you are ready to start going on the lab when class starts. Answer any questions in the handout.

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The first two weeks after break we will be working with DEMs to extract stream networks and to see if there is a correlation between precipitation and the way a stream network develops on a mountain; we will also see if this is related to vegetation, soil type, and slope. We'll use the big island of Hawai'i for the project.

You will need a 10 m DEM, precipitation data, and hydrology data. We'll get all of these files from the Hawaiian GIS website except for the 10 m DEM.

### Part 1: Data download

1. DEM: First we need a 10 m DEM for the big island. Ask the internet where you can find a DEM for Hawaii. What website did you use and why? (if you need a hint, see the note at the end of the download directions<sup>1</sup>).
2. Streams and precipitation data.
  - a. Since we need to get data for Hawaii, start out by googling Hawaii GIS data. Choose the most reputable looking website. What did you choose?
  - b. I chose the State GIS program website and highly recommend that you choose that one too. Click on the GIS Data link and look around the site. What types of data are available?
  - c. The thing we need from here is a layer of river data. Looking through the data available from the state website, you'll notice that there are two options: various hydrography/hydrology layers and streams layers. What is the difference between them? You should be able to get some information by clicking on the layer and going to preview to see what they look like. The metadata may also have some useful information. Which do you think is better and why?

- d. Since the two files come from the same source (USGS 7.5' quads), why are they so different in drainage density (drainage density is the length of streams per unit area)?
  - e. Since we are looking for information primarily about streams with water year round, we'll take the streams layer, not one of the hydrography layers. Download this file. You may want to download the metadata as well so that you have it if the file is missing metadata.
3. Finally we need precipitation data. Search the page for rainfall. Follow the link to the external site at the University of Hawaii. There should be a link for GIS data (since we don't want the produced maps, after all, we just want the data). What types of data are available? What do you want? Why?
- a. Download the Hawai'i (island, not the state) data in ESRI Grid format and mm. Look through the metadata as well and possibly save that file. You shouldn't need to do anything to these data as they come natively in grid. If you get something else, look more carefully on the website and find the grid files. What you need is the annual precipitation, but you'll get 13 raster files: 1 for each month and 1 for the year.

## Part 2: Data prep

1. Unzip all the files as many times as necessary. Make sure names are logical and locations make sense.
2. Preview the files in ArcCatalog. Do they open? What projection are they in?
3. If the files aren't in a good format (e.g., the DEM is in .bil format), convert them to the correct one.
4. If the files aren't all in the same projection, reproject them all to the appropriate UTM zone with a NAD83 datum.
5. You may want to clip all the files to just be the big island, but you don't need to.

Voila, you are done with your data prep and ready to work on your analysis on Thursday in class.

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<sup>i</sup> You can definitely get the 1/3 arc second from the University of Hawai'i's website, although googling for what you want will probably be more efficient than trying to use their overall sitemap.