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Final Project

***Summary***

This project aims to help better understand how to delineate watersheds using two different methods. The first method is by using StreamStats and ArcGIS Pro, the other is through R. Both methods allow you to delineate and map a watershed, as well as better understand the characteristics of the watershed. The practice section will allow students to test their skills, choosing the method which they find more useful to their work.

***Learning Objectives***

Students should be able to delineate watersheds on their own using StreamStats and R following this module. They should have an understanding of the layout of the USGS platform StreamStats, and how to select flowlines for delineation, as well as find information on the watershed selected. Students will also have a basic understanding of adding delineated watersheds to an ArcGIS Pro project for visualization. In addition, students will gain experience using ndhplus Tools in R to delineate and analyze watersheds. They will also learn about other R packages such as mapview as a tool for viewing watersheds.

***Measurement Details***

Much of the data used in this module is pre-collected by the USGS. In the section for watershed delineation the data there was collected through the USGS run stream stats website. The stream stats website provides information from USGS data-collection stations which allow for basin delineations, basin characteristics, and estimates of streamflow statistics. For the purposes of this module the data that was collected was for producing basin delineations. These basin delineations are most often produced using digital elevation models (DEM’s) which use satellite imagery to represent the elevation of terrain.

Along with this, our module also includes the use of ndhplus Tools in R to delineate a watershed and its flow lines. Similar to the data collected from stream stats, USGS provides data from DEM’s for use in R software. These DEM’s provide the data needed for delineation and analysis in R. A user who collects this data can turn it into 2D geometry which represents a watershed and its flowlines.

Nhdplus Tools is useful not just when you want to delineate and map a watershed, but also when you need to analyze other watershed characteristics, or combine watershed and other data. For example, if you wanted to see how precipitation and elevation change within a watershed, you could use nhdplus Tools to delineate the watershed and find its topography, and then compare to precipitation data that falls within the delineation. Data downloaded using the nhdplus Tools package can be used in the analysis of watershed characteristics. It allows one or many watersheds to be analyzed at once, and makes analysis with other parameters easy, as tables can be combined in R and visualized. The only equipment needed for this method is Rstudio and R downloaded on a laptop.

Nhdplus Tools works by taking current and historic data collected by the USGS and inputs it into R. The USGS has watersheds already classified into HUC 8 or HUC 12 categories, and has data on their location, shape size, etc.. R is simply a tool for downloading this data and manipulating it in a straightforward and fast way. It removed having to download data from the USGS and then upload it to R or manipulate it in Excel.