Storage Capacity and FDC Help Guide

Software Details

This application was built for the purpose of computing reservoir volumes and flow-duration curves from a specified location and a specific curve number within the Dominican Republic. The application builds on the work done by Michael Souffront in the Storage Capacity app. The application was designed using a python script, which was added to an ArcGIS Server as a geoprocessing service, and Tethys platform in combination with the ArcGIS API for JavaScript for the front end of the app. This application was created by Elise Jackson.

Installation:

Prerequisites:

- Tethys Platform

Clone the repository:

$ git clone https://github.com/elisenavidad/FDC-Storage.git

Then install the app in Tethys Platform.

Installation for App Development:

$. /usr/lib/tethys/bin/activate

$ cd tethysapp-storage_capacity

$ python setup.py develop

$ tethys docker start

$ tethys manage start

Installation for Production:

- For production installation follow the instructions in the following link:
http://docs.tethysplatform.org/en/latest/production/app_installation.html

Compatibility and Limitations

This application only works within the Dominican Republic. However, this same setup can be used with raster data from other places in order to get the app working at a different location. The features contained in this application are cross browser and will work with most current browsers. However, only Google Chrome and Mozilla Firefox were tested. Full functionality for other current browsers is expected but not guaranteed. An ArcGIS Server and general GIS knowledge is needed in order to implement the backend portion of this app; that is, preparing and loading raster and vector data and publising a geoprocessing service to an ArcGIS Server in order to calculate and store reservoir volume.

License

This application is licensed under an open source MIT license.

Application Design

A simple approach was taken when designing the front end part of the app. A help guide is provided in the app in case any of the steps necessary to run the app is not clear enough. The application was designed as a two-page website. It can be accessed from BYU Tethys portal (http://tethys.byu.edu/) as shown in Figure 1 below. A zoomed in image of the buttons used to calculate a potential dam and reservoir volume, and generate the flow-duration curve is shown in Figure 2. After running the application successfully, the calculated reservoir will appear on the main map window with the calculated reservoir volume in cubic meters, shown in Figure 3. The flow-duration curve can be found on the results page of the application which automatically opens in a new browser window, shown in Figure 4. Ensure that pop-ups are allowed to see the Results page.

An alternative to using Tethys is possible, since this app mainly used the ArcGIS API for JavaScript for most of its functionality (see main.js file in the repository), however, an HTML page together with styling would need to be developed from zero to pursue this alternative.

Main Files

The main files associated with this application include raster data (surface elevation, flow direction, and flow accumulation), a map service with the main streams in the Dominican Republic, and the geoprocessing service task to calculate storage capacity and the flow-duration curve values.

This application calculates the storage capacity and the flow-duration curve of a potential reservoir given any stream within the Dominican Republic, a dam height, and a curve number. Follow the steps below in order to successfully calculate storage capacity and flow-duration curves.

Zoom to Location

Using the mouse, pan and zoom to the stream reach where the storage capacity and flow-duration curve is to be calculated.

Select point of interest

Click the "Click here to draw point" button to begin selecting a location. Next click on a stream reach on the map to select your point of interest.

Specify dam height

Enter a desired dam height in the text box below "Enter Dam Height (Meters)". The default value is set to 100 meters.

Specify curve number

Enter a curve number in the text box below "Enter Curve Number". The default value is set to 80.

Calculate storage capacity

Click the "Submit" button to begin calculating storage capacity and flow-duration curve values.

Review results

After clicking the "Submit" button, the application will proceed to delineate the watershed, define the reservoir, calculate the volume and flow-duration curve values, and will post these results to the app. The volume of the reservoir will appear below the "Submit" button and will be highlighted in blue.

To view the flow-duration curve, and the calculated values, ensure that pop-ups are enabled for the page. The Results page will open automatically in a new tab, and will display a table of values and a flow-duration curve will also be generated.

Error Messages

If the user clicks outside of a major stream reach, the application will generate an automatic error message asking the user to specify a point of interest at least 100 meters within the closest stream.