

Data Visualization and Cartography

3D Data Visualization and Analysis

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In this lab, you are going to learn how to create a 3D visualization of your data for presentations.

Data Used: the following data are provided as part of **Sabie_BasinData.zip** on Moodle for you to

- Sabie DEM - SRTM digital elevation model data downloaded for free (available for anywhere on Earth at 30 m pixel resolution) from <http://earthexplorer.usgs.gov/>.
- Sabie River Watershed Boundary File – created through watershed delineation process in GIS
- Sabie River Network file – created through watershed and stream delineation process in GIS

Add DEM raster Data and other Vector Data to the Project (remember, adding your data file with predefined projection sets the project coordinate system to be the same. This is important in this particular lab, because some of the tools we use will default to the project coordinate system when you are running)

1. Open **Q-GIS with GRASS** from the Start Menu and start a new project.
2. To add a raster data, click **Layer menu → Add Layer → Add Raster Layer** option.
3. Navigate to your lab folder where you have downloaded the data and select the **Sabie_DEM.tif** file
4. To add the vector data, click **Layer menu → Add Layer → Add Vector Layer** option.
5. Navigate to your lab folder where you have downloaded the data and select the **Sabie_basin.shp** and **Sabie_Streams.shp** files
6. Save your project file

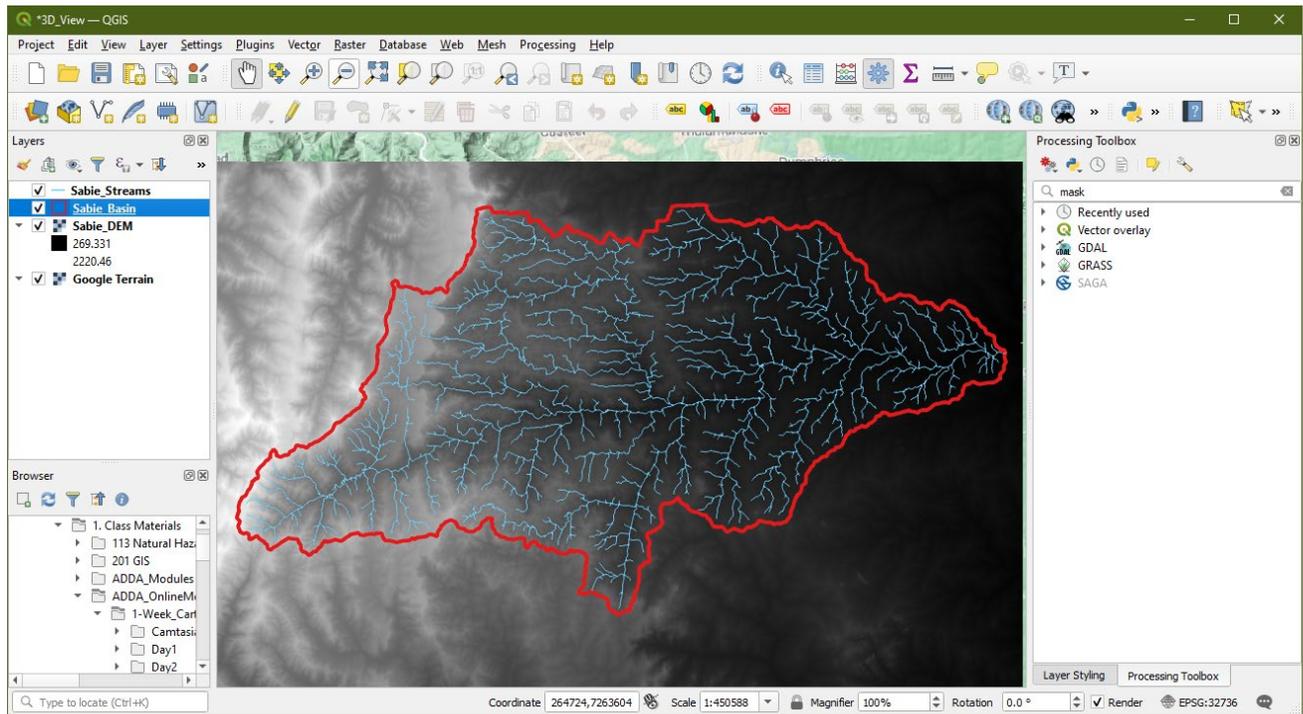
Add Base Layer to a new QGIS Project

1. If you don't have QuickMapServices plugin, go to menu **Plugins → Manage and Install Plugins**
2. Under **Search** box, type **QuickMapServices**
3. When the plugin is displayed, click on **Instal Plugin** button at bottom right corner of the window
4. When installation is successful, click on Menu **Web → QuickMapServices → Settings**. In the settings window, click on **More Services tab** and then click on **Get Contributed Pack** button at the bottom.
5. When installation is successful, click on Menu **Web → QuickMapServices → Google → Google Hybrid**.
6. Now, explore the area where we are. If you are not familiar with this location, this watershed is part of the world famous Kruger National Park.

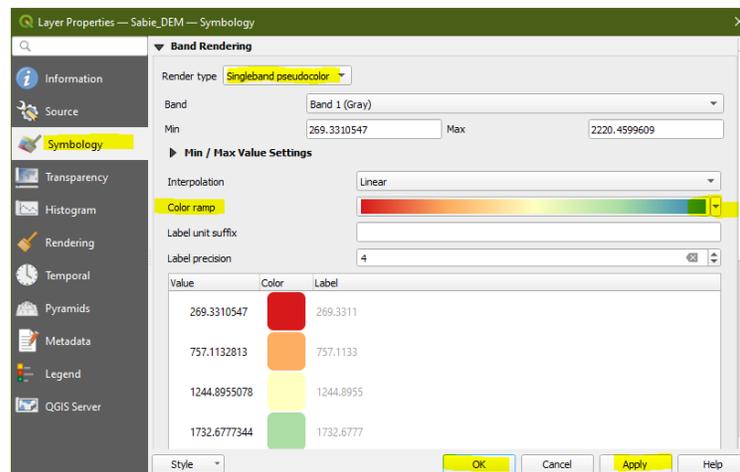
3D Visualization of Sabie River Watershed in South Africa:

It is possible to visualize your watershed and other data in 3D since we have DEM data that represents elevation values. In order to do this, we have to download another plugin called **Qgis2threejs**.

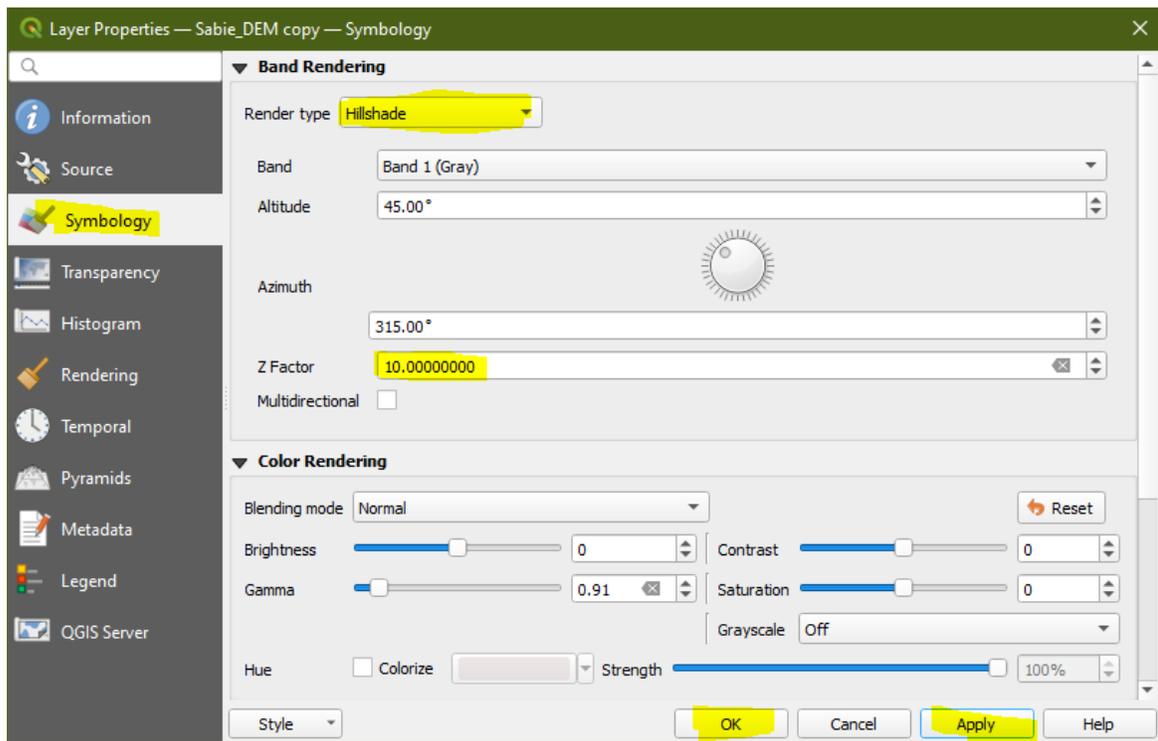
1. First, let's prepare the layers before we actually visualize them in 3D.
2. Open the layer properties for Sabie_Streams layer and change the stream color to blue.
3. Similarly, open layer properties for Sabie_Basin and change the symbology such that it only shows the outline in a prominent color without fill color.



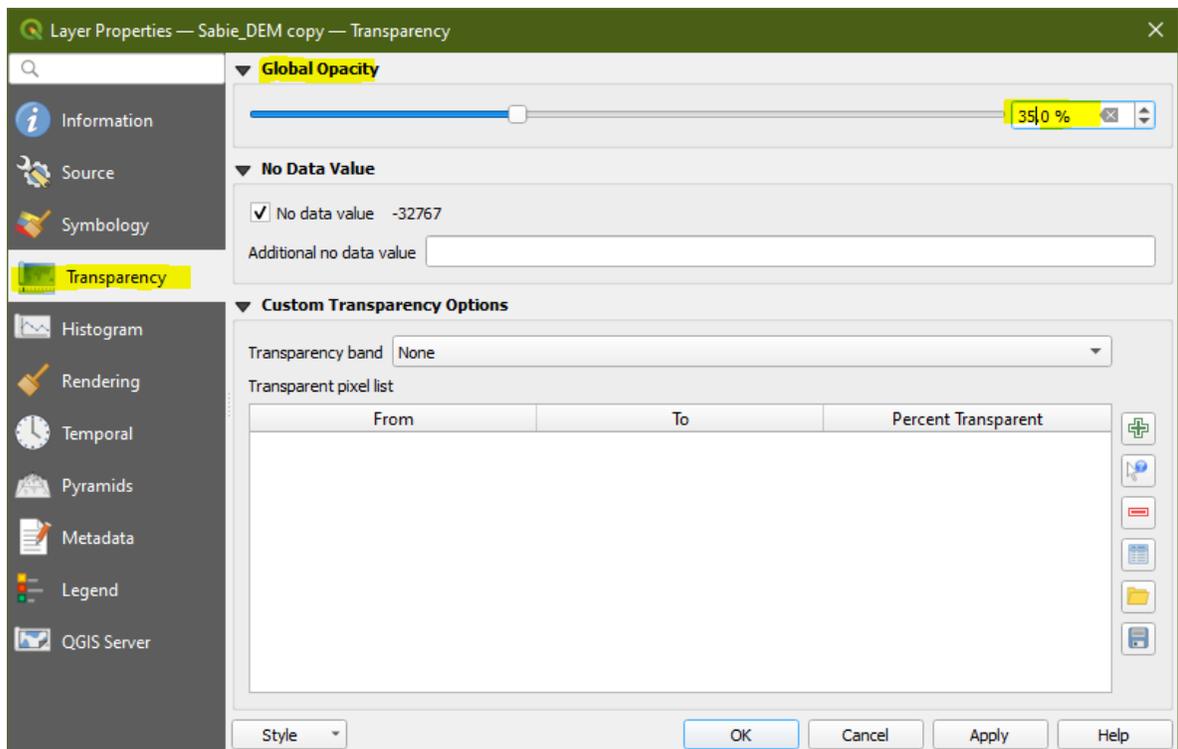
4. The raster DEM represents elevation. Instead of having it color coded to be dull gray shades, we can actually change it to shades of color that represents elevation.
5. Right click on **Sabie_DEM** layer and select Properties.
6. Under **Symbology**, Change the **Render type** to **Singleband pseudocolor**
7. Under color ramp, select **spectral**, then click **Apply**
8. Click **OK** and close out of the window.



9. Now, let's duplicate the DEM layer by **right clicking** on the layer followed by selecting **Duplicate Layer**
10. You will notice that another version of the same layer has been added. It did not create second copy on your computer. It just created another link to the same file located on your computer.
11. Right Click on the duplicate copy of the DEM and open Layer Properties and make the changes highlighted in the screenshot below. Z-Factor is a vertical exaggeration factor that makes the topography pop up in a more dramatic way.



12. Now click on **Transparency** tab, located underneath **Symbology** tab. Make the **Global Opacity** to **35%**



13. Go to menu **Plugins** → **Manage and Install Plugins**

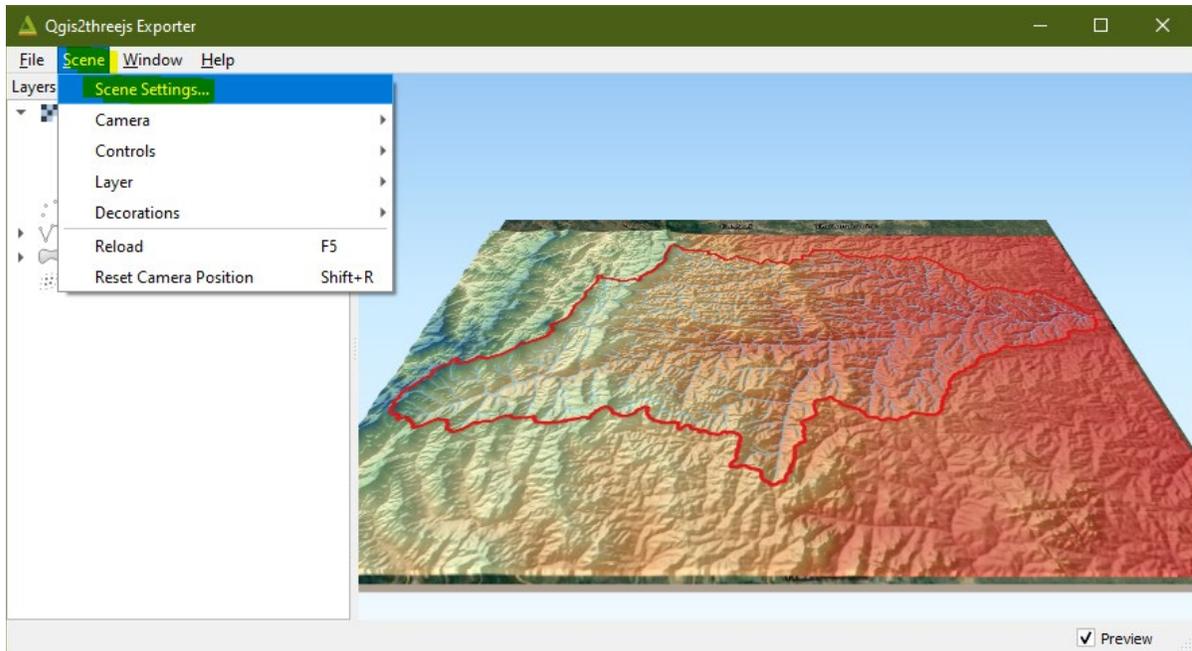
14. Under **Search** box, type **Qgis2threejs**

15. When the plugin is displayed, click on **Instal Plugin** button at bottom right corner of the window

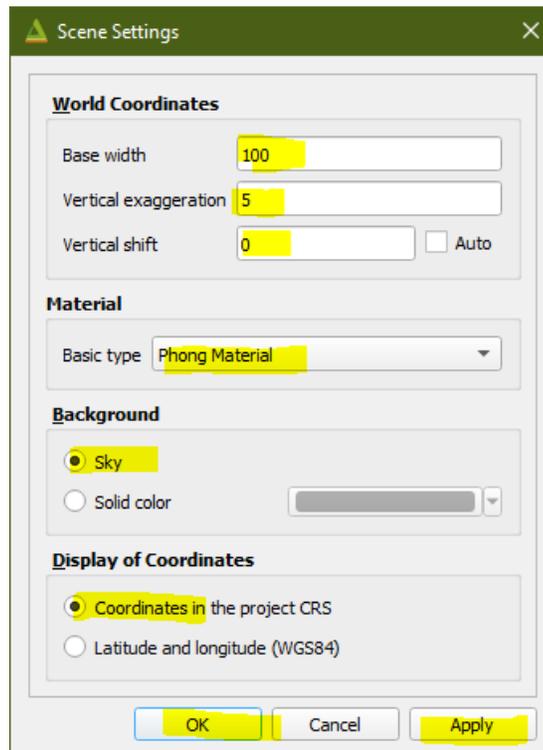
16. When installation is successful, this plugin can be accessed from Menu **Web** → **Qgis2threejs**



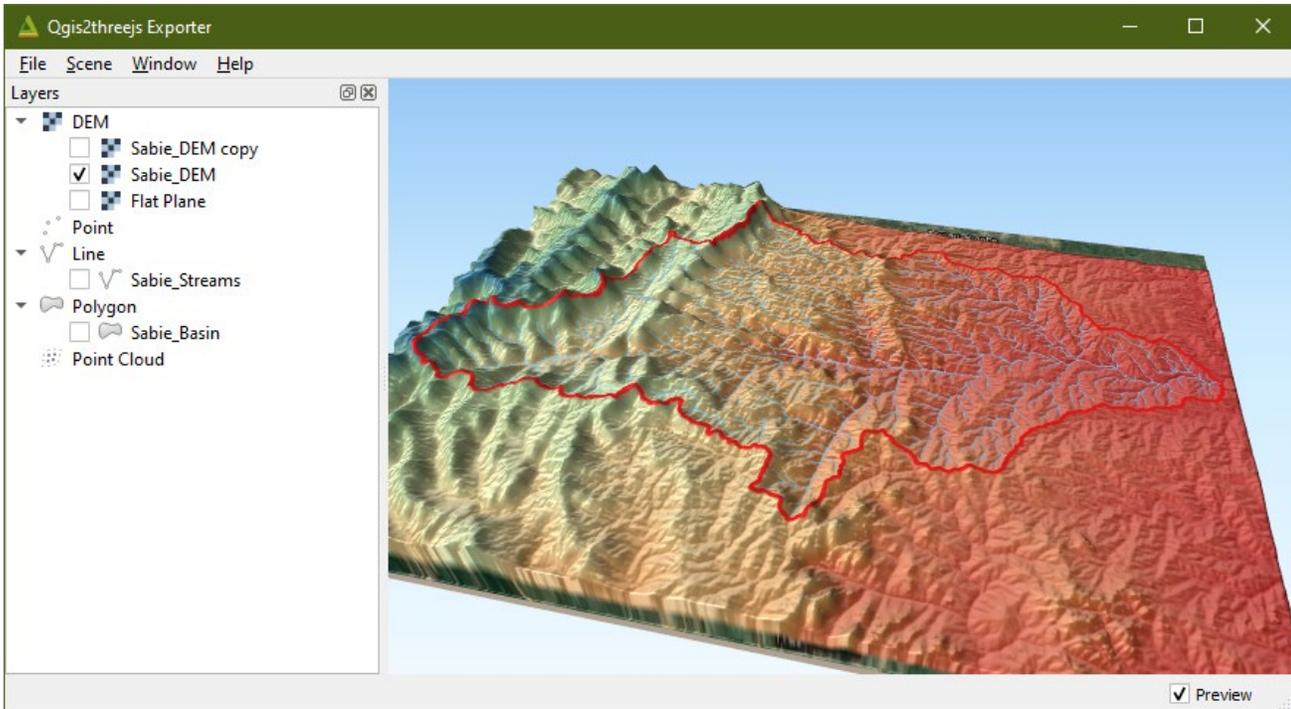
17. A new 3D visualization window will open with all layers from QGIS window pre-loaded.



18. To make the elevation data stand out, we need to exaggerate (enhance) the vertical elevation representation. To do this, click on **Scene** → **Scene Settings**. You can try out different numbers for the three boxes and hit apply to see how that affects your view. Settle down on the numbers that you like.



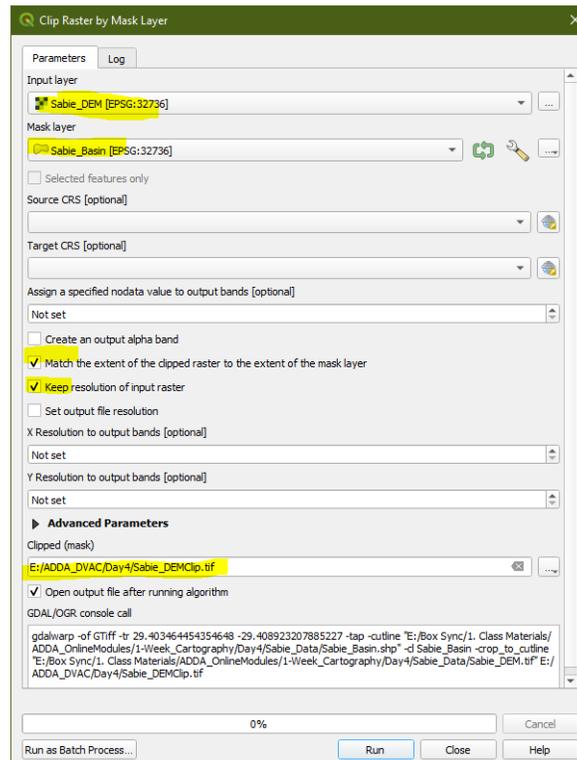
19. The 3D view can be saved as an image by clicking **File** → **Save Scene As** menu. Save the file to your folder as a jpg file. This can be included in your final map that you are going to produce next.

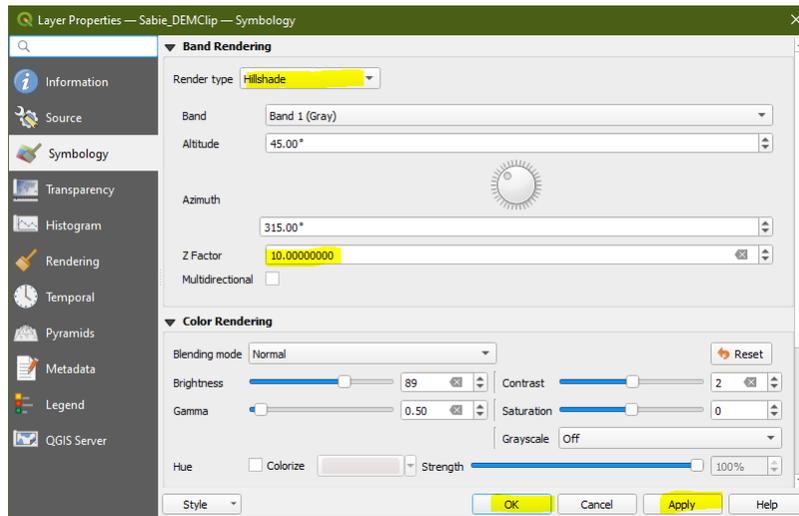


20. If you want to show the interactive 3D without using the QGIS software, you can export this as a webpage (**File** → **Export To Web**) and open the page using most standard web browsers. Try that on your own!

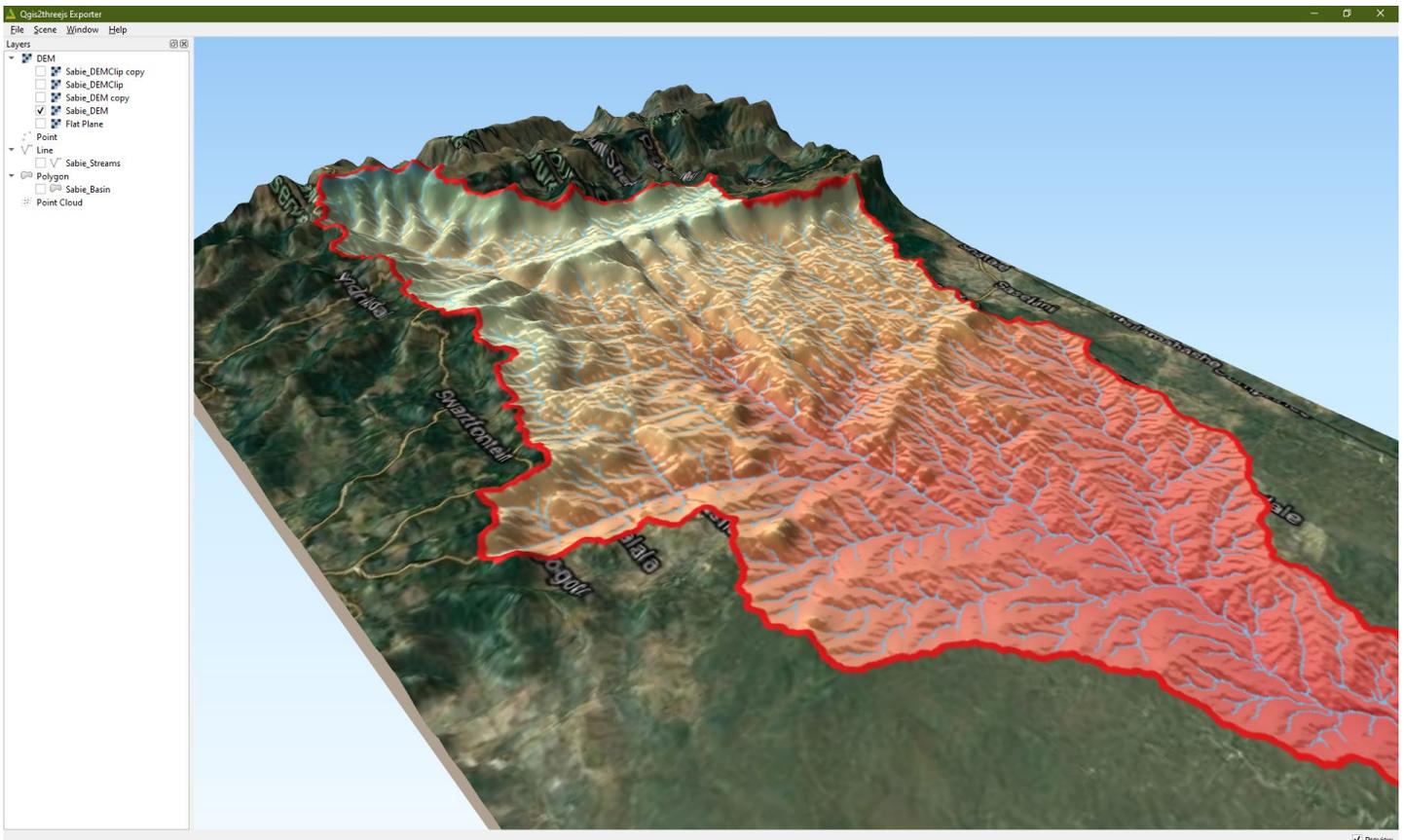
21. Now, close the 3D visual window and get back to your QGIS window.

Additional Tip: If you want to remove the DEM that is outside of the watershed area, you can use a tool **Clip Raster by Mask Layer** from the **Processing Toolbox**.





Once you get this clipped DEM, you can then repeat the process again to get a final result that might look like the image below.



That's the end! Write a paragraph reflection on how this lab went and what kind of value do you see from this skill?

- End of Session -