

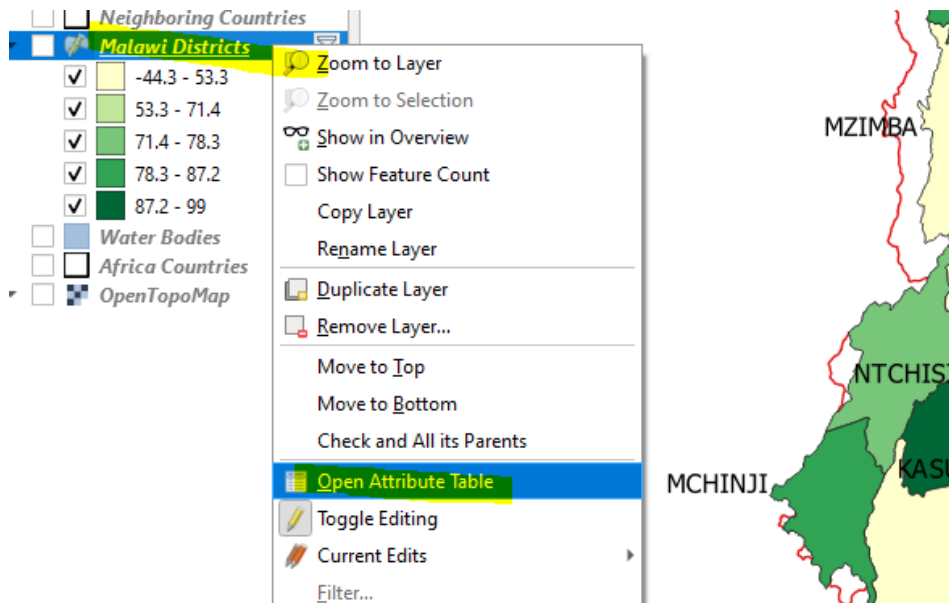
Data Visualization and Cartography

Field Calculation, Classification, and Cartogram in GIS

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Part 1: Field Calculation in QGIS and Manual Calculation for Choropleth Map

1. With **Day 4 Project open**, Right click on Malawi_Districts layer and select **Open Attribute Table** option.



2. With the attribute table open, click **Toggle Editing Mode ON** (the pencil button on top left of the attribute table).

	DISTRICT	REGION	MALE_1998	FEM_1998	TOTAL_1998	MALE_2008	FEM_2008	TOTAL_2008	MALE_2018	FEM_2018	TOTAL_2018
1	MWANZA	South	67087	70928	138015	45672	48804	94476	63533	67416	130949
2	ZOMBA RURAL	South	265859	280802	546661	279489	303678	583167	356718	390006	746724
3	THYOLO	South	218381	240597	458978	279979	307476	587455	340760	380696	721456

3. Now, click on **New Field** button . Give **Pop_Change** as Whole number (integer) type with 10 digit length.

Add Field

Name: Pop_Change


Comment: Pop Change 1998 to 2018

Type: Whole number (integer)


Provider type: integer

Length: 10

OK Cancel

4. Using **Field Calculator** option on the top left part of the attribute table window, click and select **Pop_Change** as the field for which value is to be calculated. Then click the calculate  button to calculate the **Percentage value**.

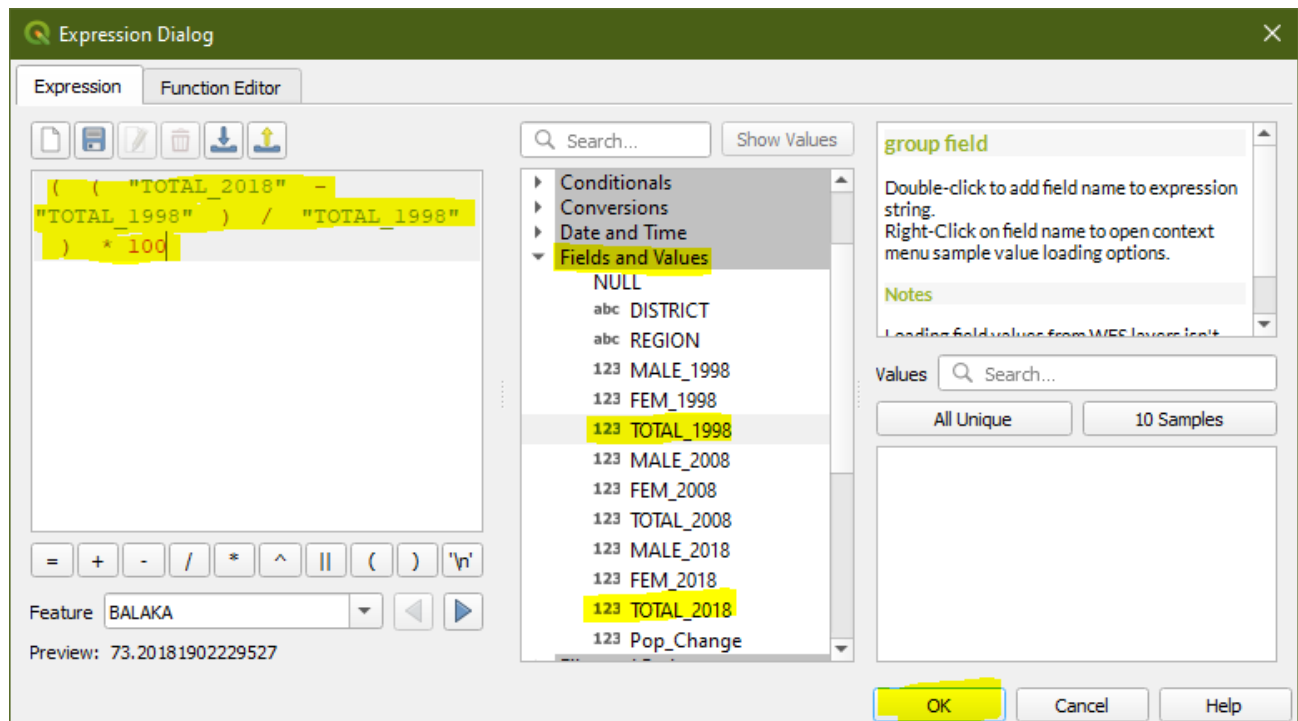
Malawi Districts — Features Total: 27, Filtered: 27, Selected: 0

123 Pop_Change = 

	DISTRICT	REGION	MALE_1998	FEM_1998
1	BALAKA	Central	120706	
2	BLANTYRE RUR...	South	413429	
3	CHIKWAWA	South	178217	


5. In the **Expression Dialog** that opens, copy and paste the following expression. Alternately, you can also create the expression by selecting the appropriate variables under **Fields and Values** and double clicking on those variables to select them.

$$((\text{"TOTAL_2018"} - \text{"TOTAL_1998"}) / \text{"TOTAL_1998"}) * 100$$



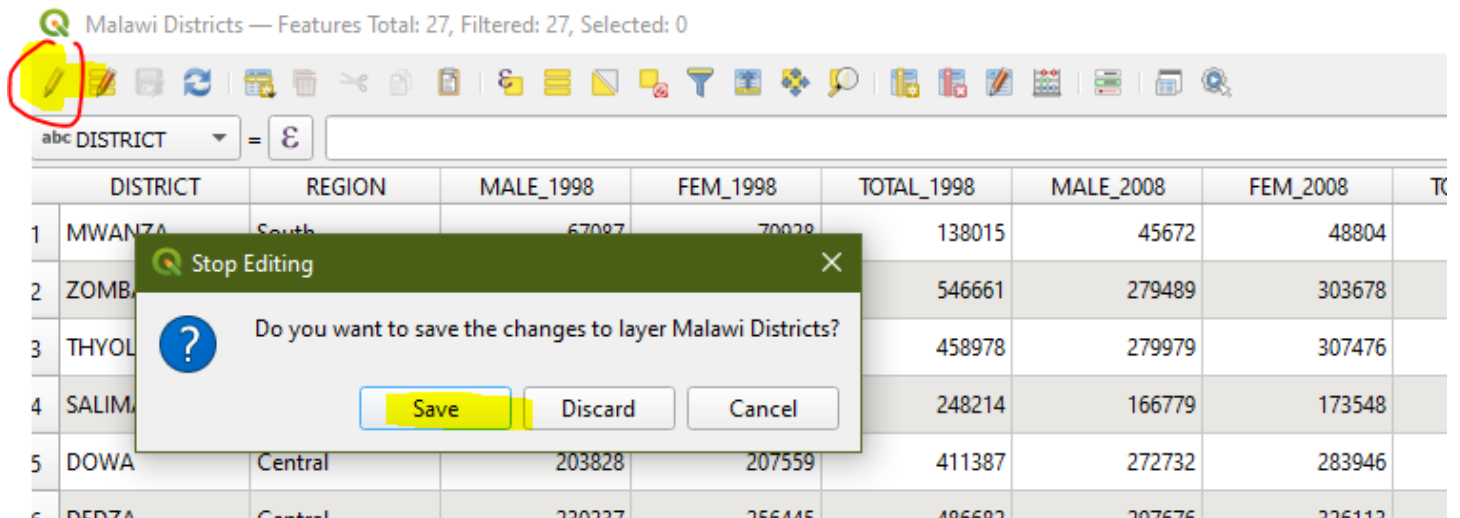
6. Click OK to close the expression dialog window. Click **Update All** button on the top right of your attribute table (as shown below) to calculate this and store this value permanently.

Malawi Districts — Features Total: 27, Filtered: 27, Selected: 0

123 Pop_Change =  `(("TOTAL_2018" - "TOTAL_1998") / "TOTAL_1998") * 100` **Update All** Update Selected

	LE_1998	FEM_1998	TOTAL_1998	MALE_2008	FEM_2008	TOTAL_2008	MALE_2018	FEM_2018	TOTAL_2018	Pop_Change
1	120706	132397	253103	151637	165111	316748	209274	229105	438379	73
2	413429	395968	809397	164546	173501	338047	218464	232756	451220	-44
3	178217	178465	356682	217981	220914	438895	276890	287794	564684	58

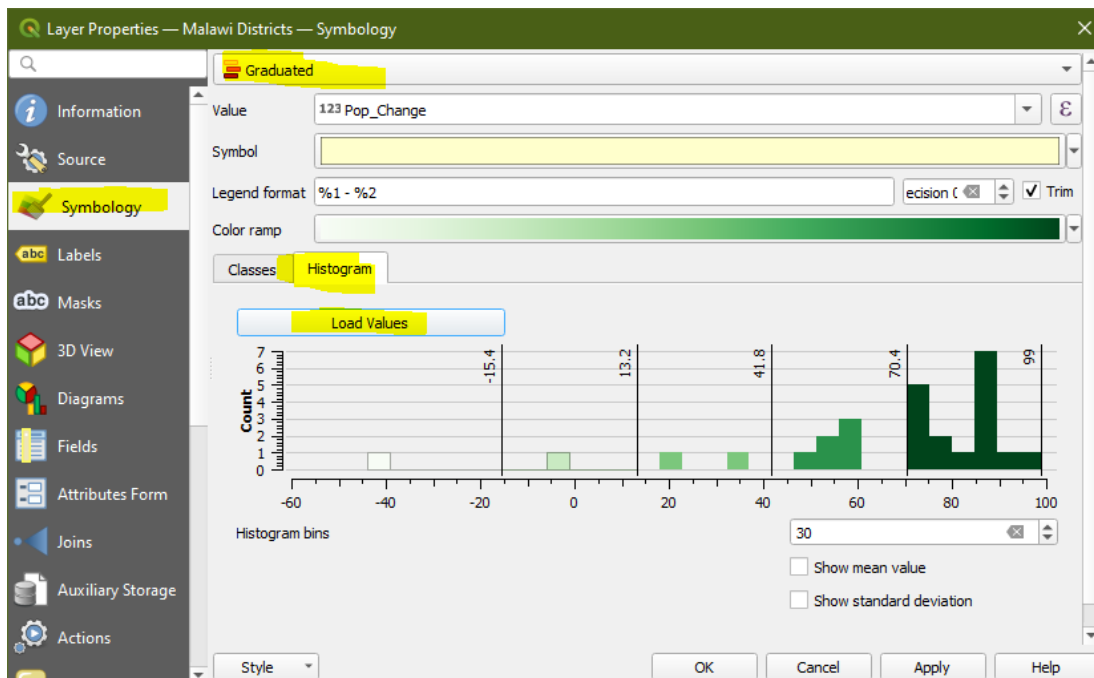
7. Now, **Toggle Editing Mode OFF** by clicking the button and confirm to **Save** when prompted.



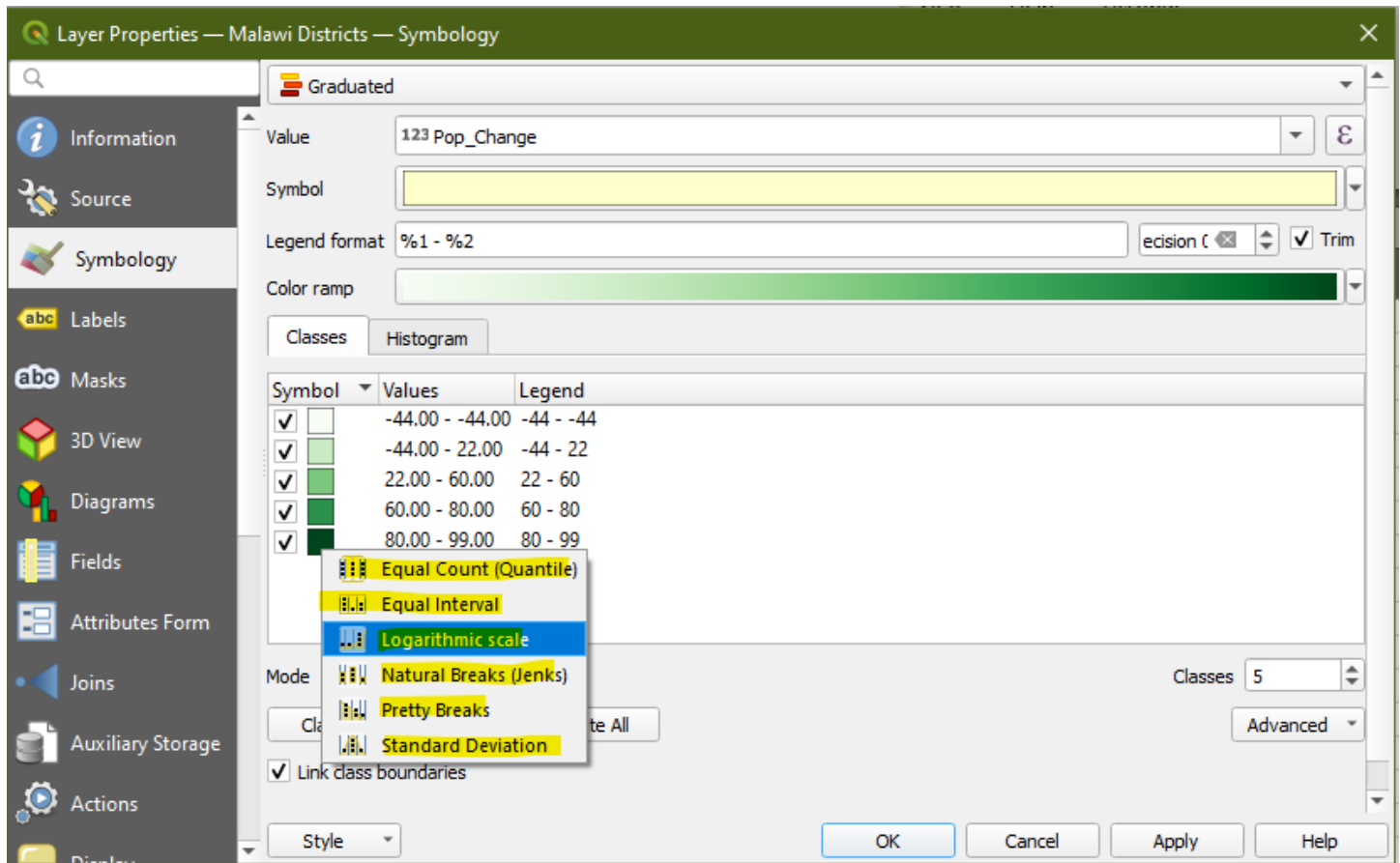
8. Now, using this approach, calculate Male to Female ratio for 2018 as a new field value.

What is the you used to calculate this: _____

9. You can do more complex expressions to calculate values for new fields. If these expressions are unable to meet your needs, it is possible to use Python code to accomplish virtually anything GIS.
10. Next, read the posted reading assignment on **Classification** on course Moodle site.
11. You need to understand your data well and make an informed decision on which classification would serve best. Understanding data involves looking at the distribution of the values for the **Population Change** field that we calculated.
12. Right click on Malawi Districts layer and open Layer Properties.
13. Under properties window, click on **Symbology** → **Histogram** → **Load Values**. Focus on the distribution of values and the ranges. In this histogram (frequency plot), Y-axis shows number of Districts and X-axis shows the percentage change in population. Note how many districts show negative value? This will hopefully help you discuss your method selection.



14. Now, switch back to **Classes** tab. Change the **Mode** (method of classification) and look at the histogram. Seeing this along with the reading material posted will help you understand the classification methods and their impacts on the map we make.

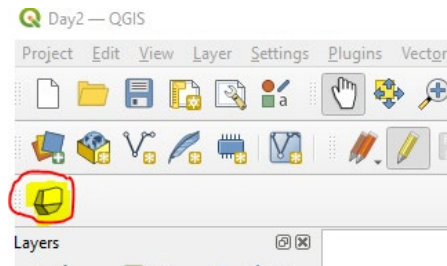


15. Reflect on how the method of classification changes the type of conclusions one might make of the variable that is being studied. Write one paragraph reflection on this and post it to the Forum on Moodle.

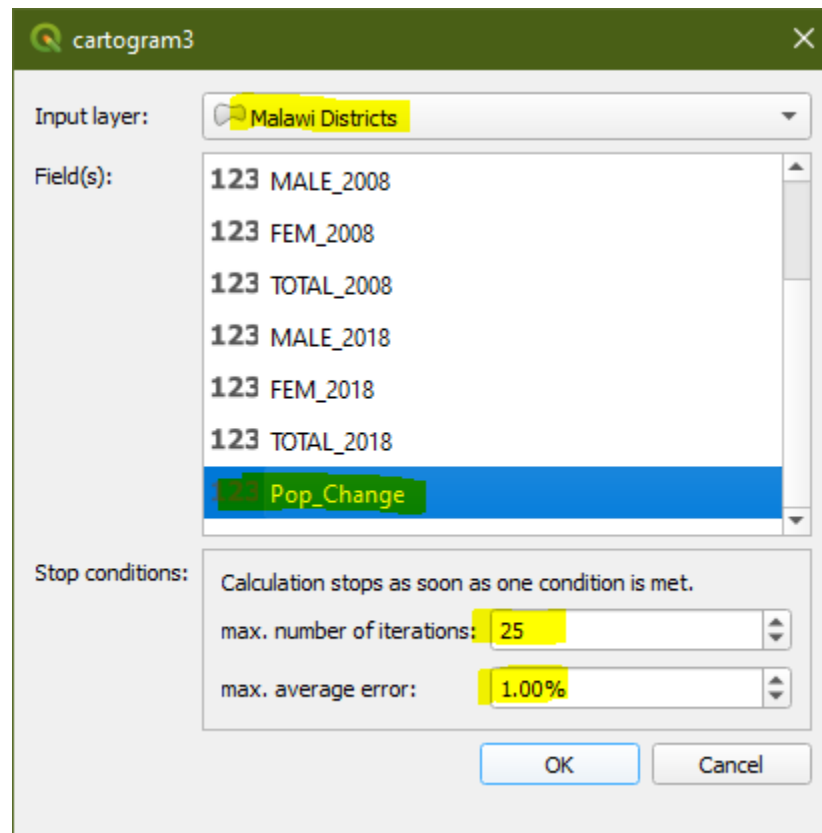
Part II – Creating a Cartogram using QGIS

Read the two reading materials posted on Moodle regarding the effectiveness of cartograms (a way of distorting shapes using one of the attributes of those shapes) and example case studies. In this activity, we are just going to create a simple cartogram that shows spatial variation in the population density at district level in Malawi.

1. Let's download the **Cartogram** plugin from the menu **Plugins → Manage and Install Plugins**
2. Under **Search** box, type **Cartogram3**
3. When the plugin is displayed, click on **Install Plugin** button at bottom right corner of the window
4. When installation is successful, you will see a new toolbar added to the project.

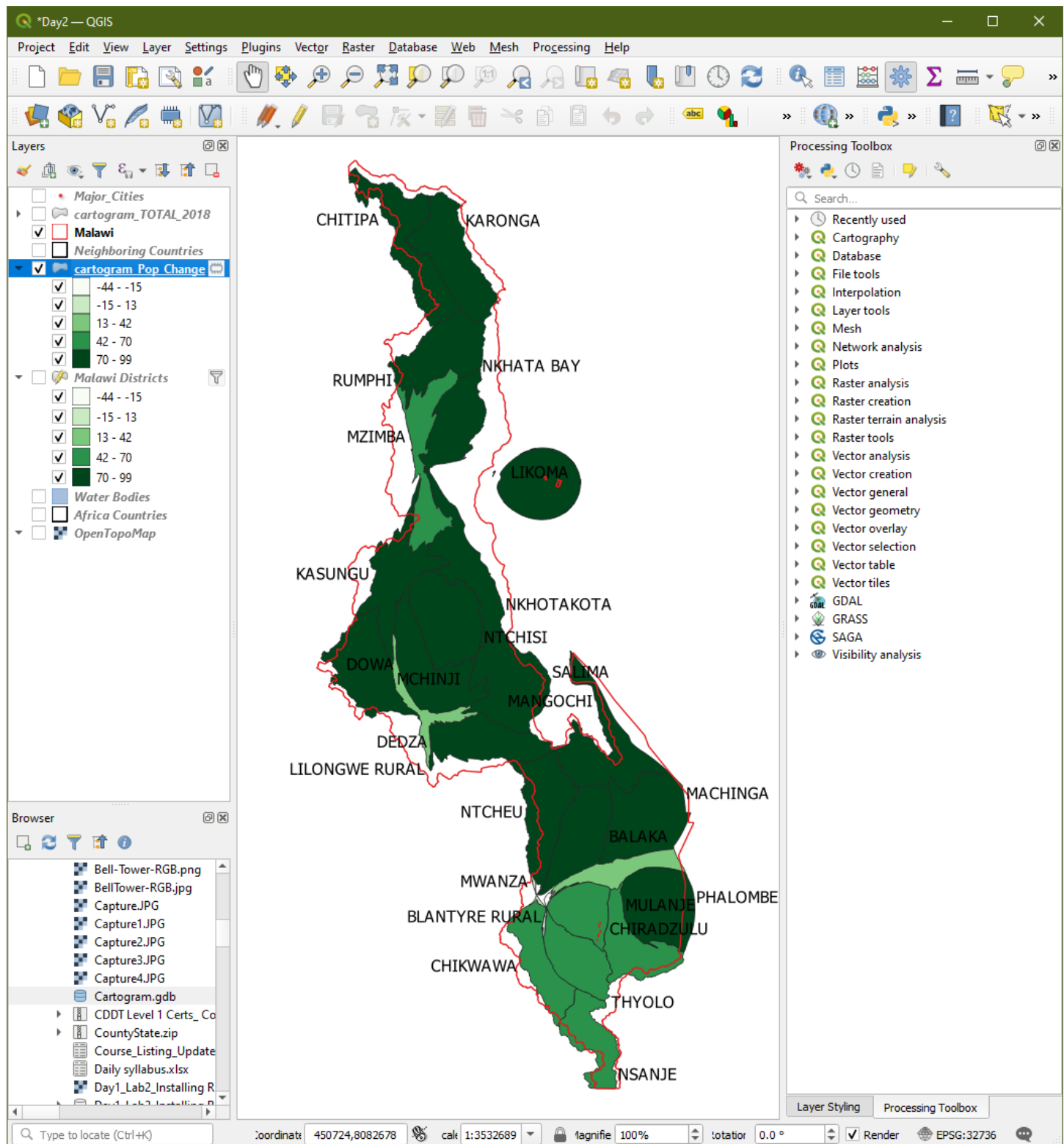


5. When installation is successful, click on Menu **Vector → Cartogram → Compute Cartogram**
6. In the cartogram window, select **Malawi Districts** layer as the **Input layer**; **Pop_Change** as the **Field**; 25 for maximum number of iterations; and 1% for maximum average error.
7. The algorithm runs iteratively, so the higher the number of iterations, better it is. Similarly, the lower the error margin permitted, the better will be the result. However, if your computer is not able to handle these value for iterations and error, you can change them both to 10 and see if that helps your computer.



More details on how this cartogram is computed can be found at the following website.
<https://github.com/austromorph/cartogram3>

8. When completed, this is what the result would look like:



-End of Session-