NDVI in Raster Calculator

Now that you already extracted the bands that you need for the assessment, we can now compute for the NDVI using the raster calculator.

1. Search for 'raster calculator' in the Processing Toolbox.
2. On the Processing toolbox window go to the predefined formula list to select the NDVI and click Add.
3. The predefined formula window will prompt then choose from the dropdown list which among your bands refer to the NIR or Red then click Ok.

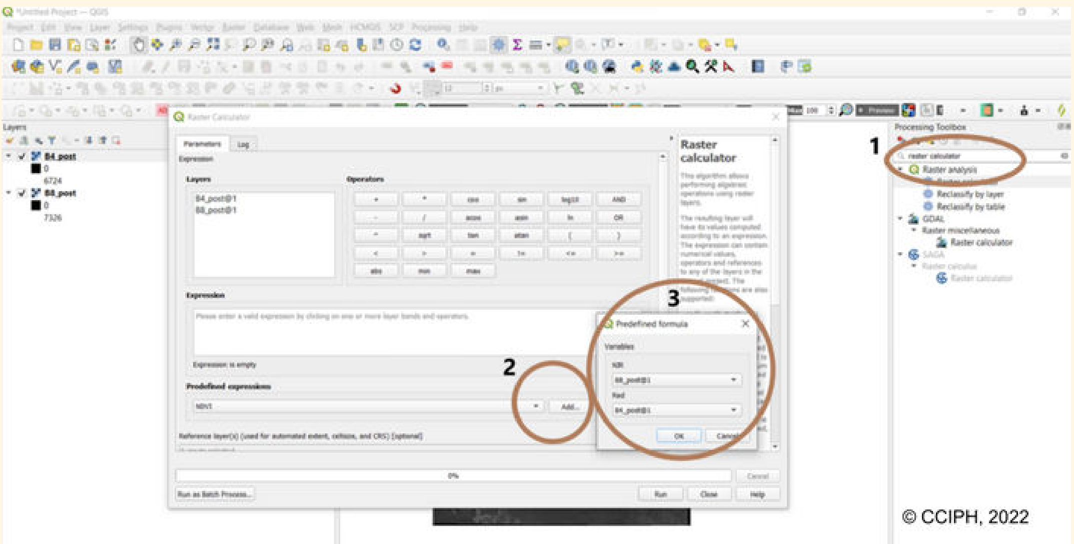

Figure 125. Accessing NDVI using the Raster Calculator

4. Select your reference layer, this can either be one of your bands which will be the reference for extent, cell size and CRS of your output file.
5. Set your output folder location and file name.
6. Click *Run*.

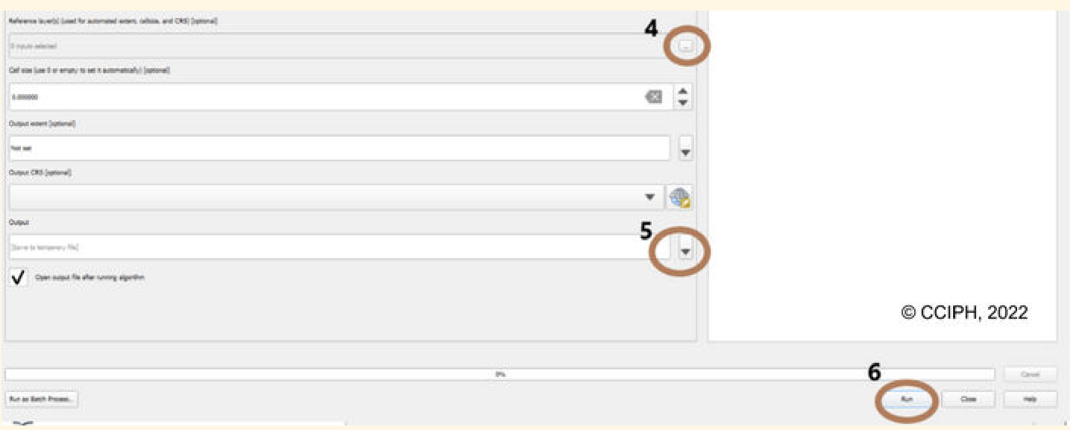

Figure 126. Setting the Reference Layer and Output Location of the computed NDVI

Now try computing the NDVI for pre- and post-Odette in your AOI and set the output name as "NDVI_2021" and "NDVI_2022", respectively.

Exercise 4: Spatial Analysis for Identifying Regions of Interest

Duration	Purpose of Learning
1 hour	• To identify regions of interest for green assessment by working with raster and vector data

Requirements:

- QQGIS (latest most stable version)
- Laptop/Desktop
- *Lesson 10: Spatial Analysis for Identifying Regions of Interest by Working with Raster and Vector Data from the Geospatial Training Manual on Green Assessment for Ecosystems Disaster Mapping*
- Raster layers:
- NDVI (pre and post)
- NDVI difference
- Slope
- Aspect
- Land cover
- DEM
- Vector layers:
- Roads
- Center point

Expected Output:

- One raster layer representing the most damaged area that meets the criteria set in *Lesson 10* to be determined as the region of interest

---

About this Exercise

This exercise provides steps on how the region of interest can be determined using various QGIS Processing tools based on the suggested criteria such as slope, elevation, aspect, land cover, accessibility and NDVI difference.

Instructions

Instructions

1. Prepare and load all the necessary layers for your area of interest such as the following:

Raster layers:

- NDVI (pre and post)
- NDVI difference
- Slope
- Aspect
- Land cover
- DEM

Vector layers:

- Roads
- Center point

For this activity, you may use and access the readily available layers from the sample dataset activity folder:

- DEM (raster)
- Land Cover (raster)
- Roads
- Center Point
- NDVI (pre and post)

2. Once you have prepared and loaded all the relevant layers to QGIS, follow the steps provided in *Lesson 10* below to generate the region of interest based on the provided criteria.

Lesson 10

Spatial Analysis for Identifying Regions of Interest by Working with Raster and Vector Data

Duration	Purpose of Learning
1 hour	• To identify regions of interest for green assessment by working with raster and vector data

Requirements:

- Lecture with powerpoint presentation, on-the fly demonstration of image downloading and hands-on activity

In this lesson we are going to show a procedure for performing a spatial analysis using QGIS that can be used in mapping your area of interest given certain conditions. Spatial analysis that can be computed using QGIS includes raster analysis, e.g., NDVI difference, slope, aspect and land cover, and vector analysis, e.g. road buffer and center buffer. These analyses can help guide planners and decision makers in selecting the ideal area of interest given a certain scenario.

Spatial Analysis

In this section we are going to show different raster analysis that can be used in mapping to solve the given problem.The figure below shows the primary steps in solving the problem which involves the following steps: state the problem; get the data; analyze the problem and present the results.

Figure 127. Spatial Analysis Steps

Step 1 : Problem

We have an extreme event. In an urgent situation with limited budget, resources, and manpower, we want to find the most damaged area nearest to the center of the municipality.

Step 2: Get the Data

Data needed:
Raster
- NDVI difference
- Slope
- Aspect
- Land cover

Vector
- Roads
- Center point

Data readily available from the sample dataset activity folder:
- DEM (raster)
- Land Cover (raster)
- Roads
- Center Point
- NDVI (pre and post)

To obtain some of the dataset that still needs to be generated to solve the given problem, we can use the different tools that are readily available in QGIS.

- **Hillshade**

The DEM layer shows you the elevation of the terrain, but it can sometimes seem a little abstract. It contains all the 3D information about the terrain that you need, but it does not look like a 3D object. To get a better impression of the terrain, it is possible to calculate a hillshade, which is a raster that maps the terrain using light and shadow to create a 3D-looking image. In generating the hillshade in QGIS the vertical angle and azimuth must be specified. Vertical angle sets how high the light source is ranging from zero to ninety degrees, while azimuth has values ranging from zero degrees (North) through 90 degrees (East), 180 degrees (South), and 270 degrees (West).

Figure 128

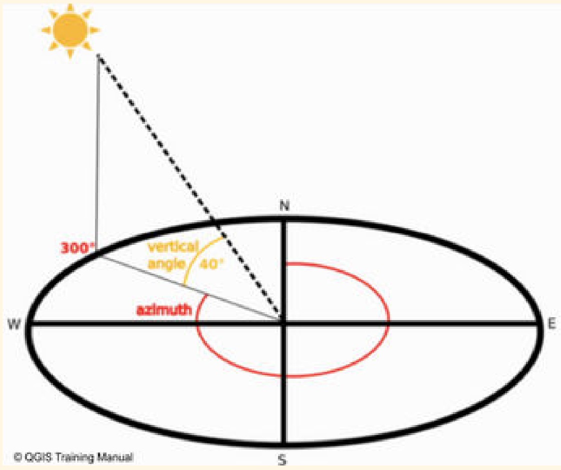

Figure 128. Hillshade

To generate the hillshade of your raster using QGIS follow the steps below:

1. From the QGIS *Processing Toolbox*, search for 'hillshade' and select the *Hillshade* under *Raster Terrain Analysis.*

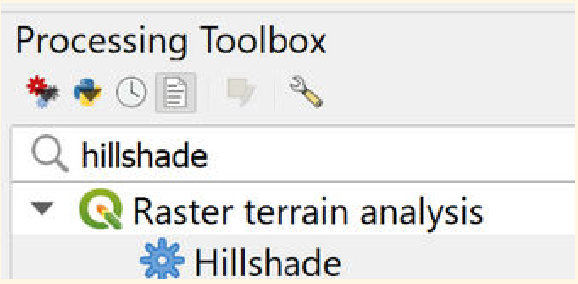

Figure 129. Hillshade from the Processing Toolbox

2. In the *Hillshade* processing window use the following input layers and values:

Input layer: DEM
Z factor: 1
Azimuth of the light: 300 degrees
Altitude of the light: 40 degrees

3. Save the file to your designated outputs folder

4. Click *Run*

➔ Figure 130

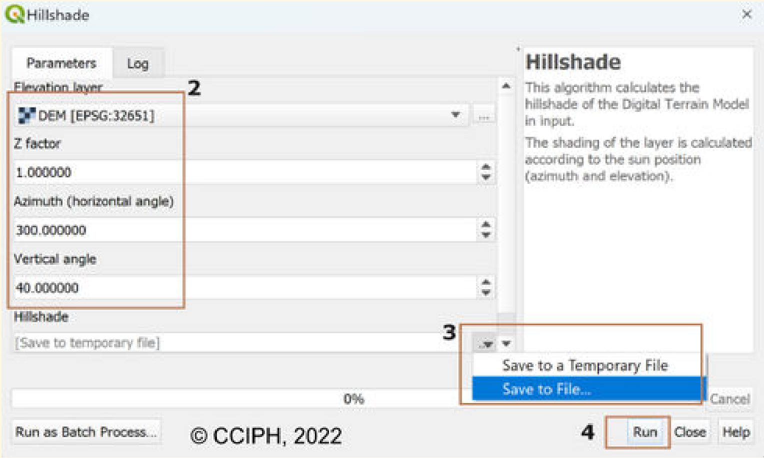

Figure 130. Hillshade Parameters

The output will look like a plaster cast as shown on the image below. This can be used as an overlay to better visualize your area of interest. You can change the transparency of the hillshade layer, but when you do this makes the hillshade brighter, which will lead to dimming the colors behind it. . You can try to adjust this dimming according to what works best for you.

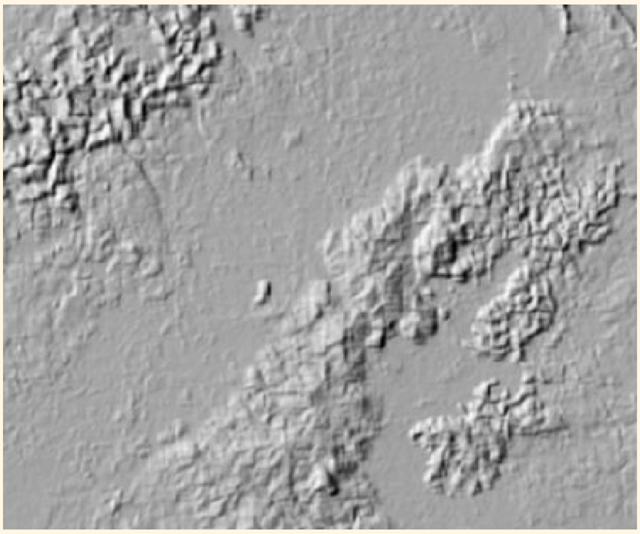

Figure 131. Hillshade Output

- **Slope**

Slope refers to how steep the terrain is showing its angle of inclination to the horizontal.

To generate the *Slope* of your raster using QGIS follow the steps below:

1. From the QGIS *Processing Toolbox*, search for 'slope' and select the *Slope* under *Raster Terrain Analysis.*

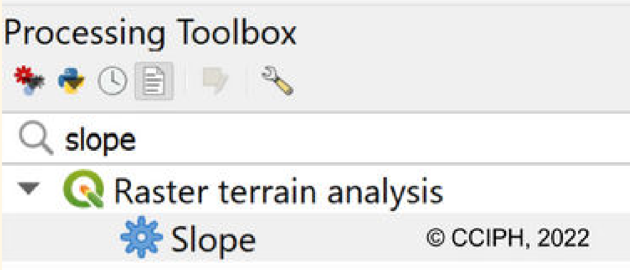

Figure 132. Slope from the Processing Toolbox

2. In the Slope processing window, select the DEM as your input layer.
3. Save the file to your designated outputs folder
4. Click Run

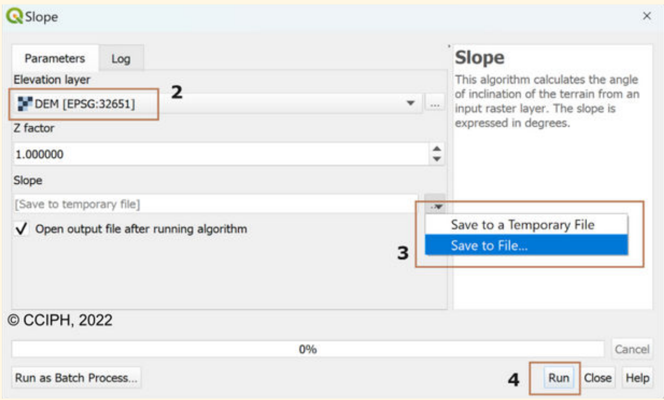

Figure 133. Slope Parameters

The slope output will look like the image below as default. You may also change its symbology through its properties. There are numerous color ramp options available in QGIS that you can choose from.

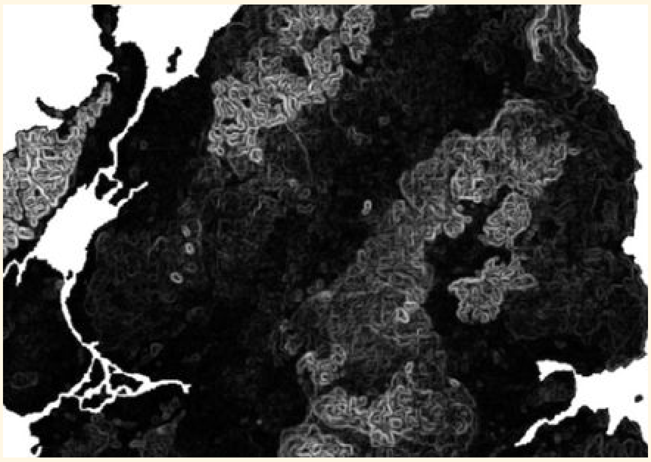

Figure 134. Slope Output

- ## Aspect

This refers to the compass direction that the slope of the terrain faces.

1. From the QGIS *Processing Toolbox*, search for 'aspect' and select the *Aspect* under *Raster Terrain Analysis*.

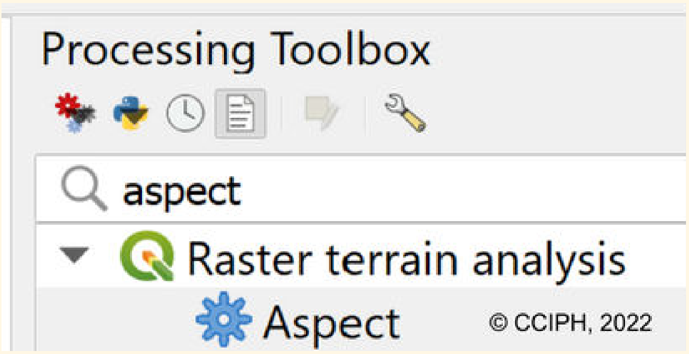

Figure 135. Aspect from the Processing Toolbox

2. In the *Aspect* processing window, select the DEM as your input layer.
3. Save the file to your designated outputs folder
4. Click *Run*

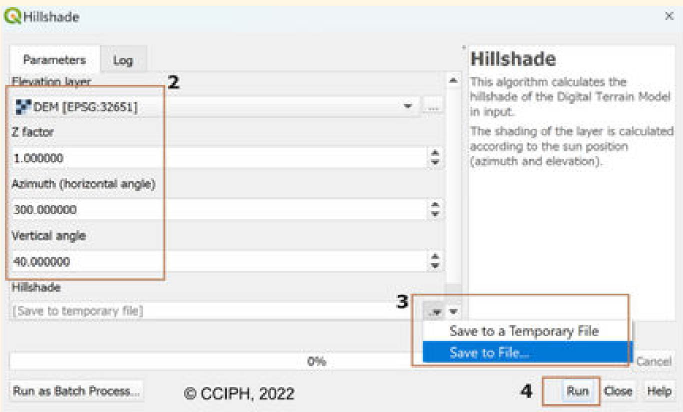

Figure 136. Aspect Parameters

The aspect output of the DEM should look similar to the image below.

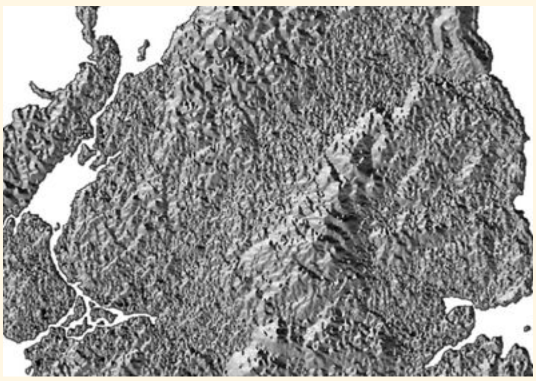

Figure 137. Aspect Output

Step 3: Analyze the Problem

With all the available layers that we have, let us now determine the area that meets the following criteria using QGIS:

- Near the center of the municipality
- Within 500 m from the road
- High NDVI difference value
- Facing east
- Steep slope (>40°)

For easier integration of layers for our analysis, let us assign a code value for the different raster layers shown below:

Table 8. Code Values to Raster Layers for Analysis

Layer	High (Value= 2 or 3)	Low (Value= 1)
NDVI difference*	> 0.3	<= 0.3
Slope	> 40 degrees	<= 40 degrees
Aspect	60 to 120 degrees	Other values
Land Cover	Forest (2) = 3;Cropland (5) = 2	Others
Proximity to Road	500 m	1000 m
Proximity to Center	2 km	4 km

NDVI Difference Formula = NDVI_Pre – NDVI_Post

- **Reclassifying Land Cover**

Let us first analyze the land cover layer located in your exercise folder. Load your land_cover layer to your QGIS map. The layer should look like the image below when loaded. The following raster values correspond to the following land cover class definitions:

Continue

1- water
2- trees
4- flooded vegetation
5- crops
7- built-up area
8- bare ground
9- snow/ice
10- clouds
11- rangeland

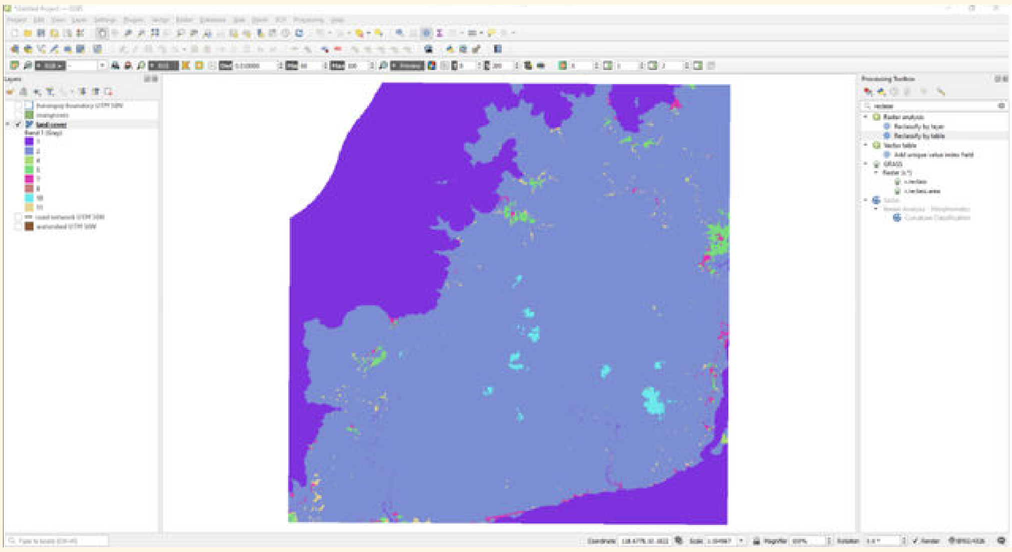

Figure 138. Land Cover Layer
Source: Sentinel-2 10m Land Use/Land Cover Time Series

On the *Processing Toolbox* search and select the "*Reclassify by Table*". In the *Reclassify by Table* window follow the steps below:

1. In the *Reclassify by Table* window, select land cover as your raster layer to classify.
2. Change the range boundaries to min <= value <=max.
3. Click on the three dots on the *Reclassification* table to set your criteria table.
4. In your criteria table specify the minimum, maximum and new assigned value You can click *Add Row* should you need to add another row of criteria.
5. If you are already satisfied with the criteria, click Ok
6. On the *Reclassify by Table* window determine the output data type and change it to integer by selecting *Int32*.
7. Specify your output location and file name.
8. Click *Run*

Your reclassified output layer should only have three values present: 1, 2 and 3.

Note: Make sure that all the data type that you will use for your analysis is consistent i.e. all reclassified rasters are in Int32.

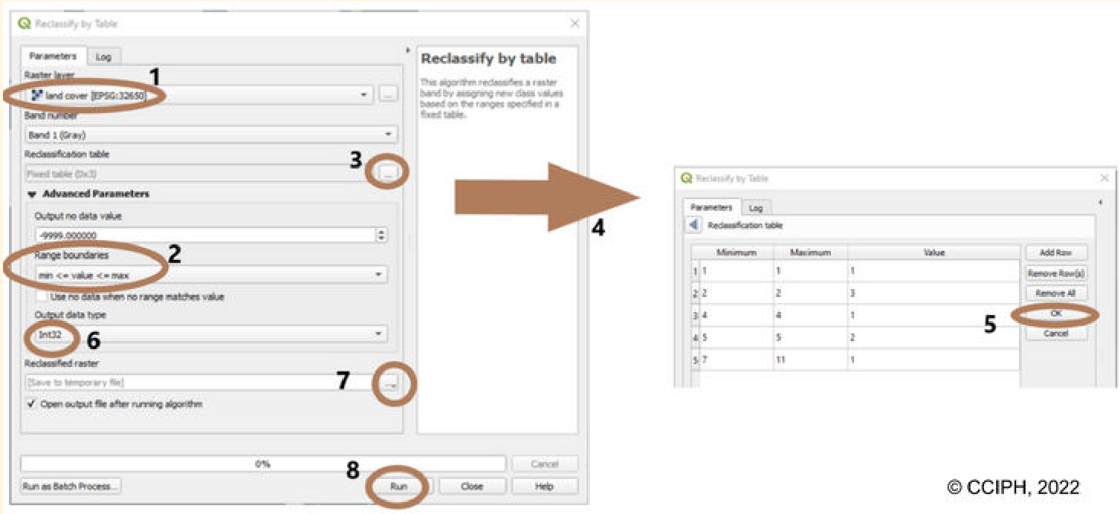

Figure 139. Reclassifying the Land Cover Layer

- ## Reclassifying the Slope

In the *Processing Toolbox* search and select the Reclassify by Table and follow the steps below:

1. In the *Reclassify by Table* window, select slope as your raster layer to classify.
2. Change the range boundaries to *min < value <=max*
3. Click on the three dots on the *Reclassification* table to set your criteria table.
4. In your criteria table specify the minimum, maximum and new assigned value You can click *Add Row* should you need to add another row of criteria.
5. If you are already satisfied with the criteria, click Ok
6. On the *Reclassify by Table* window determine the output data type and change it to integer by selecting *Int32*.
7. Specify your output location and file name.
8. Click *Run*

Note: Make sure that all the data type that you will use for your analysis is consistent i.e. all reclassified rasters are in *Int32*.

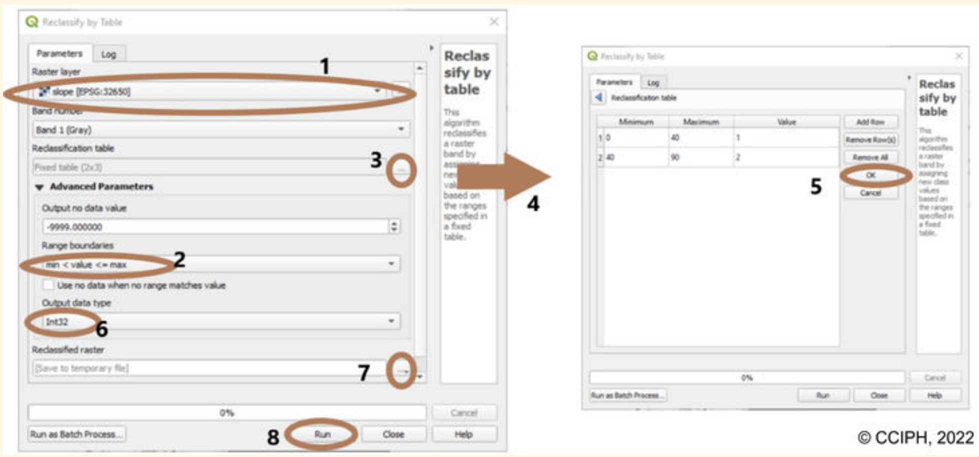

Figure 140. Reclassifying the Slope Layer

- **Reclassifying the Aspect layer**

In the *Processing Toolbox* search and select the Reclassify by Table and follow the steps below:

1. In the *Reclassify by Table* window, select aspect as your raster layer to classify.
2. Change the range boundaries to min *<= value <=max*
3. Click on the three dots on the *Reclassification* table to set your criteria table.
4. In your criteria table specify the minimum, maximum and new assigned value You can click *Add Row* should you need to add another row of criteria.
5. If you are already satisfied with the criteria, click Ok
6. On the *Reclassify by Table* window determine the output data type and change it to integer by selecting *Int32*.
7. Specify your output location and file name.
8. Click *Run*

Note: Make sure that all the data type that you will use for your analysis is consistent, i.e., all reclassified rasters are in Int32.

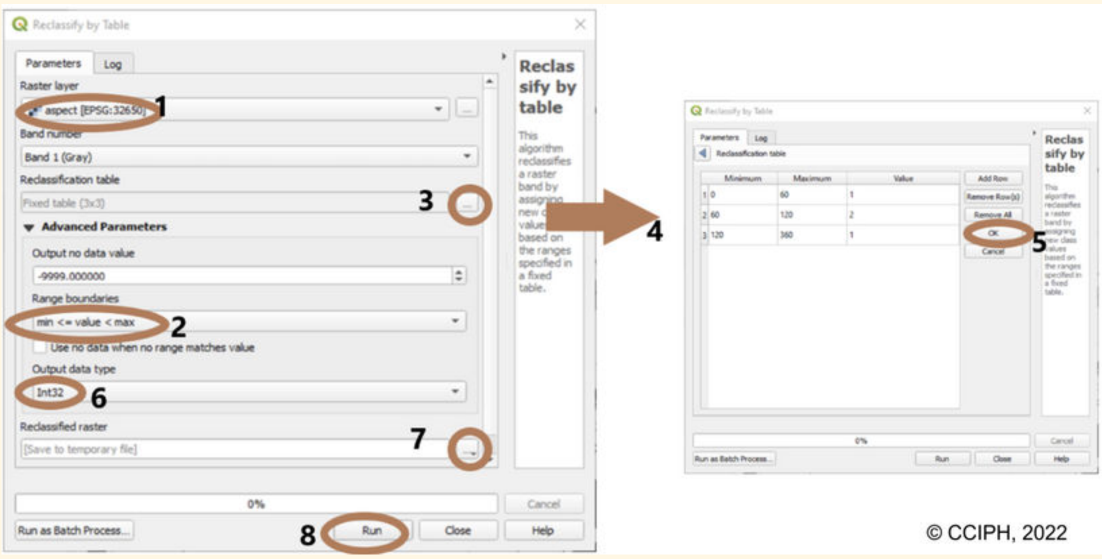

Figure 141. Reclassifying the Aspect Layer

- **NDVI Difference**

In the sample dataset in the provided exercise folder there is a readily available NDVI difference layer. However, if you wish to compute the difference on your own make sure to load in the QGIS project the NDVI pre- and post- raster layers and follow the instructions below:

Continue

1. In the QGIS *Menu Bar* click on *Raster* and select the *Raster Calculator*

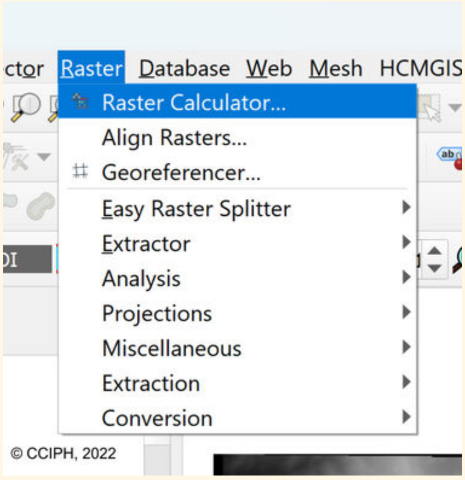

Figure 142. Raster Calculator

2. In the *Raster Calculator* window, double click on your NDVI pre layer from the Raster Bands list to appear in the *Raster Calculator Expression*.
3. Click on the minus sign from the *Operators* section to add to the current *Raster Calculator Expression*.
4. Double click on the NDVI post layer from the *Raster Bands* list.
5. Review the *Raster Calculator Expression* and make sure that the note below the expression shows "*Expression valid*"
6. Set the output layer name and location.
7. Click on the *Selected Layer Extent* button to have the same extent as your pre and post NDVI layers.
8. Make sure that the *Output CRS* is consistent with the pre and post NDVI layers that are appropriate to your AOI.
9. Click on *Ok*

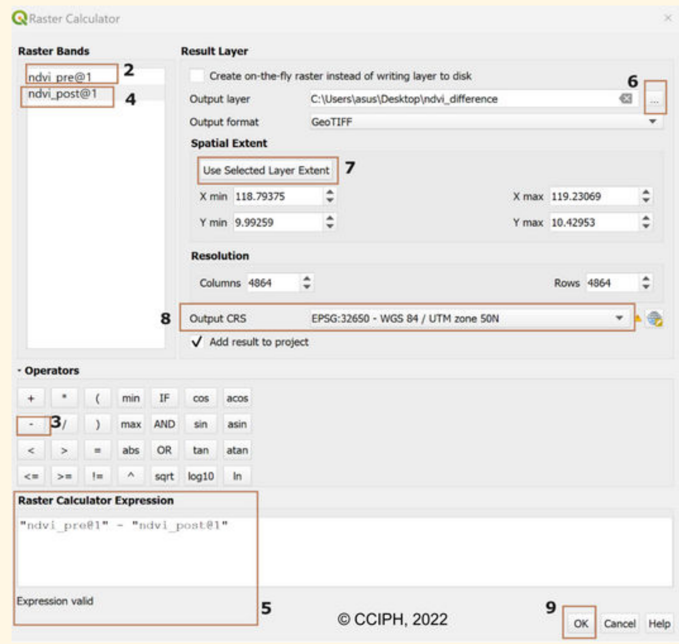

Figure 143. NDVI Difference in Raster Calculator

- ### Reclassifying the NDVI Difference Layer

To compute the criteria involving *NDVI Difference*, check on the *Histogram* of your NDVI difference layer. To do this, select your NDVI difference layer and right click then select *Properties*. On the *Layer Properties* window that will prompt, click on *Histogram*. Take note of the minimum and maximum values shown since this is needed for reclassification.

In the *Processing Toolbox* search and select the *Reclassify by Table* and follow the steps below:

1. In the *Reclassify by Table* window, select *ndvi_difference* as your raster layer to classify.
2. Change the range boundaries to min <value <=max
3. Click on the three dots on the *Reclassification table to set* your criteria table.
4. In your criteria table specify the minimum, maximum and new assigned value. You can click *Add Row* should you need to add another row of criteria.
5. If you are already satisfied with the criteria, click *Ok*.
6. On the *Reclassify by Table* window determine the output data type and change it to integer by selecting *Int32.*
7. Specify your output location and file name.
8. Click *Run.*

Note: Make sure that all the data type that you will use for your analysis is consistent, i.e., all reclassified rasters are in Int32.

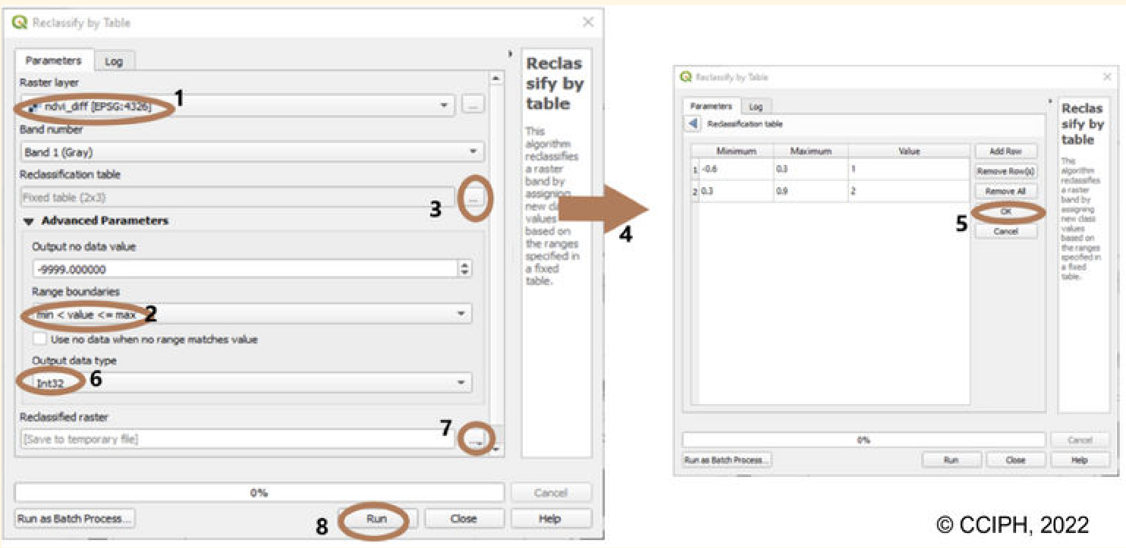

Figure 144. Reclassifying the NDVI Difference Layer

Continue

- **Road Buffer**

Another criteria for our problem is the distance of the road. Load the road network layer to *QGIS* from your activity folder. In your *Processing toolbox* search and select for the 'Multi ring buffer (constant distance)' and follow the instructions below:

1. In the *Multi- Ring Buffer* window, select your road network from the activity folder as your input layer.
2. Set the number of rings to 2.
3. Set the distance between rings as 500 meters.
4. Determine the location and name of your output layer.
5. Click *Run*.

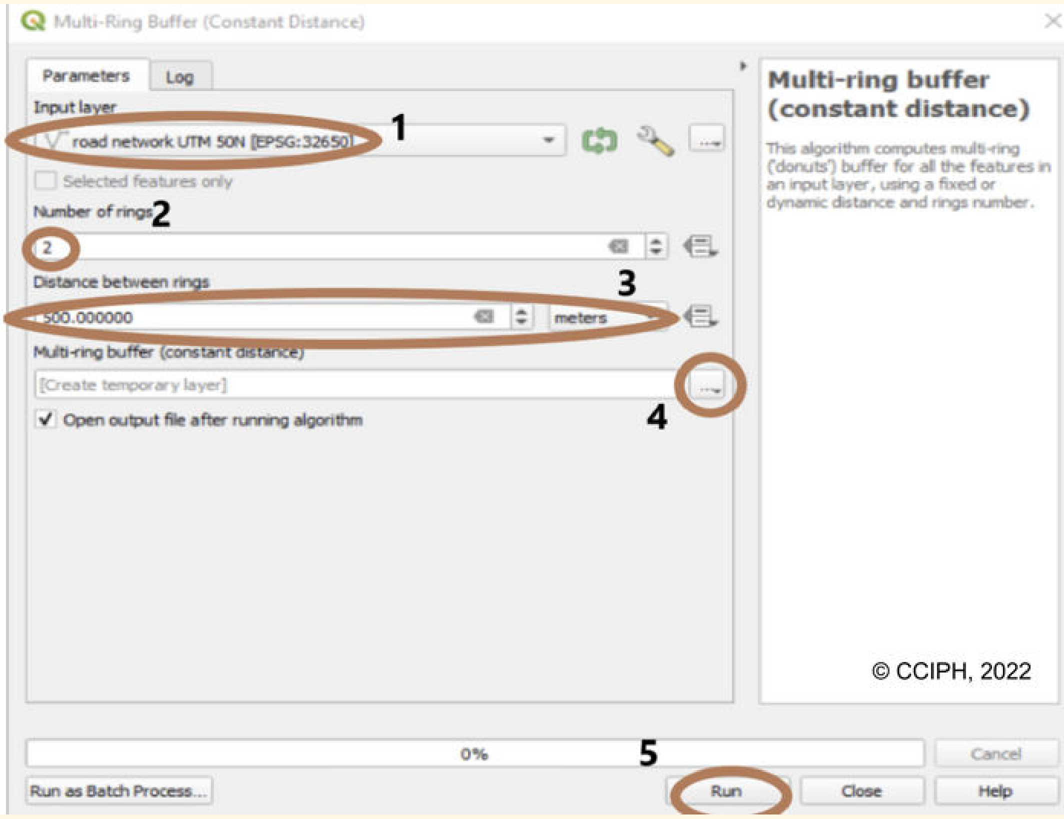

Figure 145. Multi-ring Buffer

After the buffer process, your output layer will look similar to the image below:

Continue

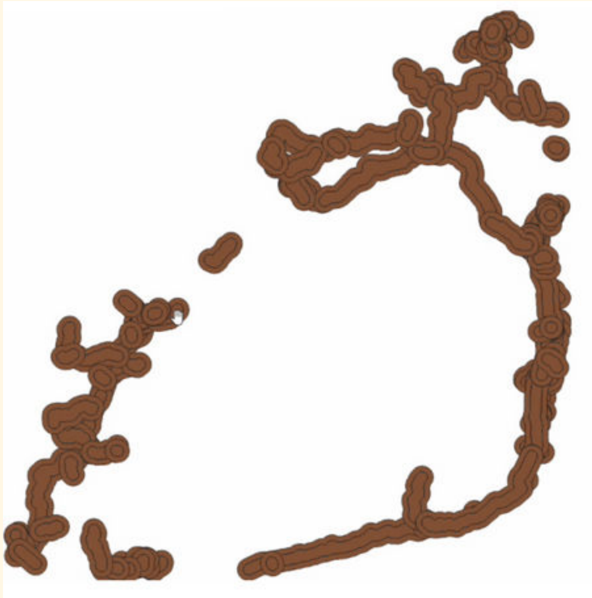

Figure 146. Road Buffer Initial Output

You will notice from the initial result of the buffer process that there are adjacent boundaries of the buffered road networks that need to be unified.

To unify the adjacent networks based on their common attribute value, load the buffered road layer to QGIS. Click on Vector from the Menu Bar. From the dropdown list options, click *Geoprocessing* Tools and select *Dissolve*.

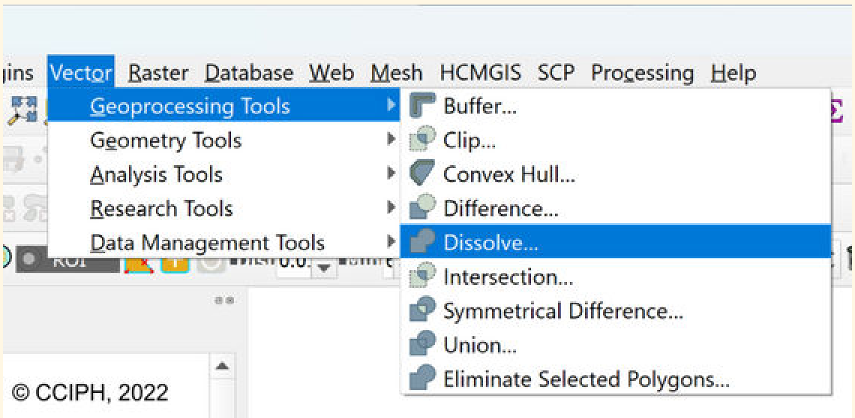

Figure 147. Accessing the Dissolve Tool from the Vector Menu Bar

After opening the Dissolve tool window follow the instructions below:

1. In the *Dissolve window*, select the road network as your input layer.
2. In the *Dissolve field(s)* check the ringId as the common attribute value.
3. Determine the output name and folder location of your dissolved road layer.
4. Click *Run*. Then you may close the *Dissolve* window after.

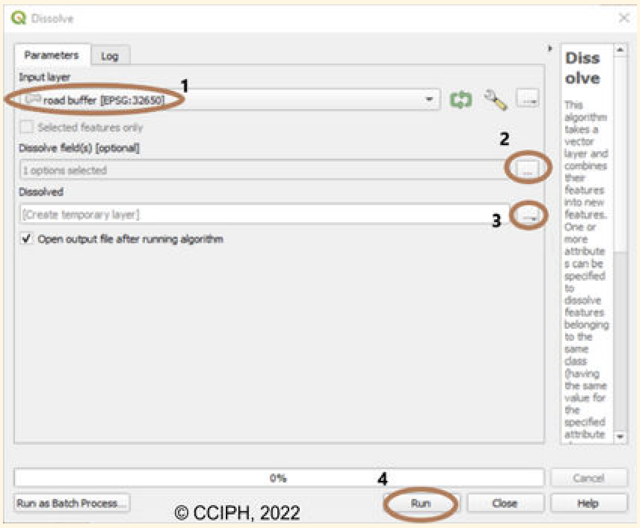

Figure 148. Figure 147. Accessing the Dissolve Tool from the Vector Menu Bar

The dissolved road buffer will result to the figure similar below:

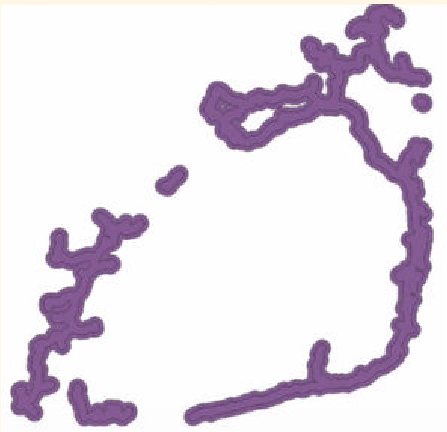

Figure 149. Dissolved Road Buffer Output

Since the road network buffer is a vector layer while the other layers that we will use for the analysis is a raster layer, let us convert the buffered road network to raster using the instructions below.

1. From your *Processing* toolbox search bar, type 'rasterize' and select Rasterize (Vector to Raster) from the results.
2. On the *Rasterize* window, select your dissolved road buffer as the input layer.
3. Select distance as the field to use for burn-in value.
4. Use *Georeferenced* units as the output raster size units.
5. Set both the Width/ Horizontal resolution and the Height/Vertical resolution to 10 meters to be consistent with the resolution of your other raster data.
6. In the *Output extent*, select the *Use map canvas* extent
7. The *Output data* type should be in integer, Int32.
8. Set the layer name and location folder of your output and click *Run* to initialize the conversion.

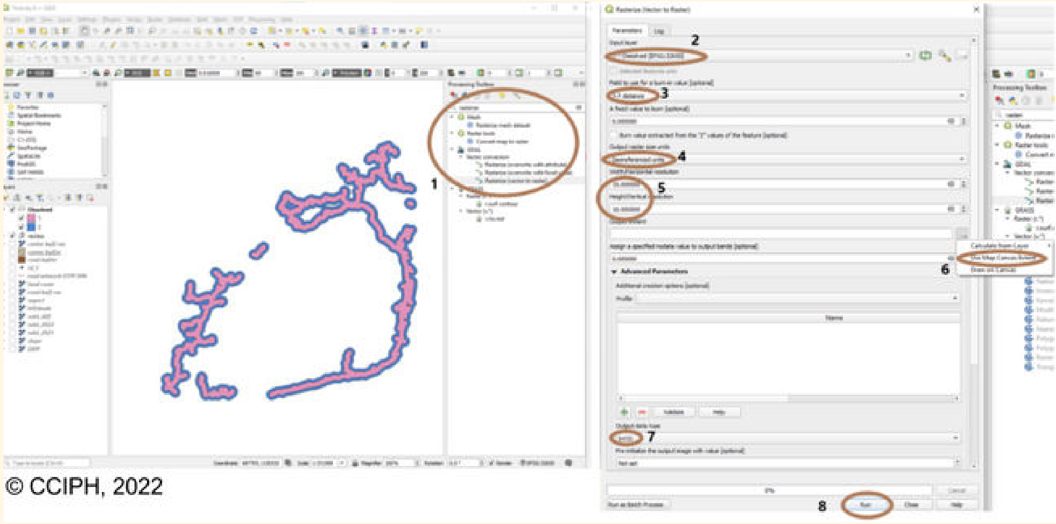

Figure 150. Converting Road Buffer Vector Layer to Raster

- ### Reclassifying Road Buffer

Now that the road buffer is already in the raster format, we can now reclassify its values.

1. From the *Processing toolbox*, select the reclassify by table. In the *Reclassify* by Table window, select the dissolved road buffer as your raster layer to classify.
2. Change the range boundaries to min *<=value <=max*
3. Click on the three dots on the *Reclassification* table to set your criteria table.
4. In your criteria table specify the minimum, maximum and new assigned value You can click *Add Row* should you need to add another row of criteria.
5. If you are already satisfied with the criteria, click *Ok*
6. On the *Reclassify by Table* window determine the output data type and change it to integer by selecting Int32.
7. Specify your output location and file name.
8. Click *Run*

Note: Make sure that all the data type that you will use for your analysis is consistent, i.e., all reclassified rasters are in Int32.

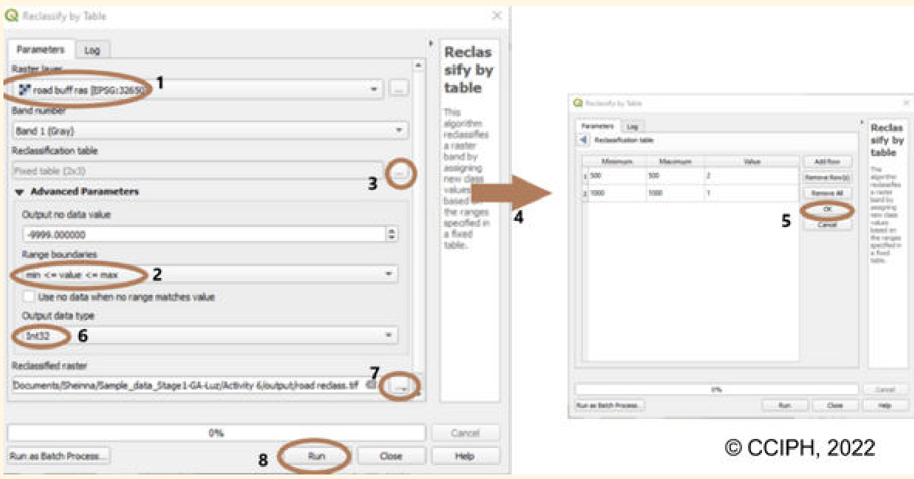

Figure 151. Reclassifying the Road Buffer Layer

- **Center Buffer**

The last criteria that we need is the center buffer. Choose any center layer from the center folder in your activity folder and load it to your *QGIS project*. In your Processing Toolbox search and select for the 'Multi ring buffer (constant distance)' and follow the instructions below:

1. In the *Multi- Ring Buffer* window, select your road network from the activity folder as your input layer.
2. Set the number of rings to 2.
3. Set the distance between rings as 2000 meters.
4. Determine the location and name of your output layer.
5. Click *Run*.

This is almost the same process as the buffer process of the road networks. You may use the previous screenshots guide as your reference (Figure 143).

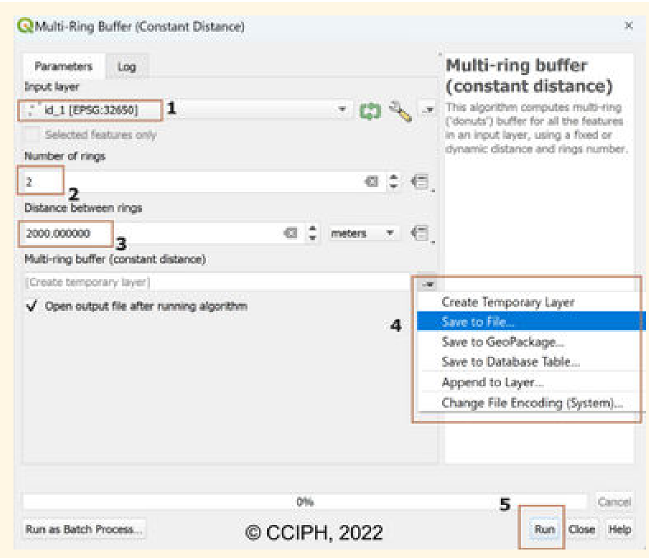

Figure 152. Center Buffer

- **Reclassify Center Buffer**

1. From the *Processing toolbox*, select the reclassify by table. In the *Reclassify* by *Table* window, select the rasterized center buffer as your raster layer to classify.
2. Change the range boundaries to min *<=value <=max*.
3. Click on the three dots on the Reclassification table to set your criteria table.
4. In your criteria table specify the minimum, maximum and new assigned value You can click *Add Row* should you need to add another row of criteria.
5. If you are already satisfied with the criteria, click *Ok*.
6. On the *Reclassify by Table* window determine the output data type and change it to integer by selecting Int32.
7. Specify your output location and file name.
8. Click *Run*.

Note: Make sure that all the data type that you will use for your analysis is consistent, i.e., all reclassified rasters are in Int32.

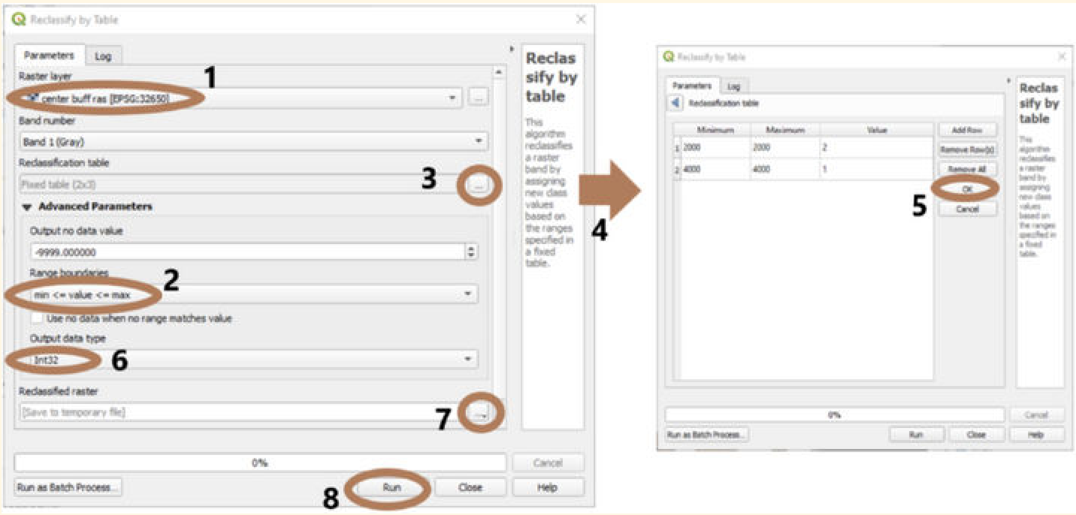

Figure 153. Reclassifying the Center Buffer

Since all the criteria provided are already computed, the region of interest where all of these criteria are existing can now be identified.

1. Load all your reclassified raster layers (aspect_reclass, land_cover_reclass, road_buffer_reclass, slope_reclass, center_reclass and ndvi_reclass) to your QGIS project.
2. Using the *Processing toolbox* search and select the *Raster Calculator*.
3. In the *Raster Calculator* window, double click on the name of the layer from the layers panel to be added in the *Expression* tab. The expression should be: "aspect reclass@1" + "land cover reclass@1" + "road buffer reclass@1" + "slope reclass@1" + "center reclass@1" + "ndvi reclass@1"

Note: Layer name may vary depending on what you used as the layer name to your previous output

4. Click on the '+' sign from the *Operators* to add the plus sign on the expressions tab.
5. Continue doing steps 1 and 2 until all the necessary layers for the list of criteria provided are inside the *Expressions* tab.
6. After completing the expression, make sure that the text below the *Expressions* tab says 'Expression is valid'.
7. Use any of the layers that you added in the expression as your reference layer.
8. Set the file name and folder location of your output layer and click *Run*.

Continue

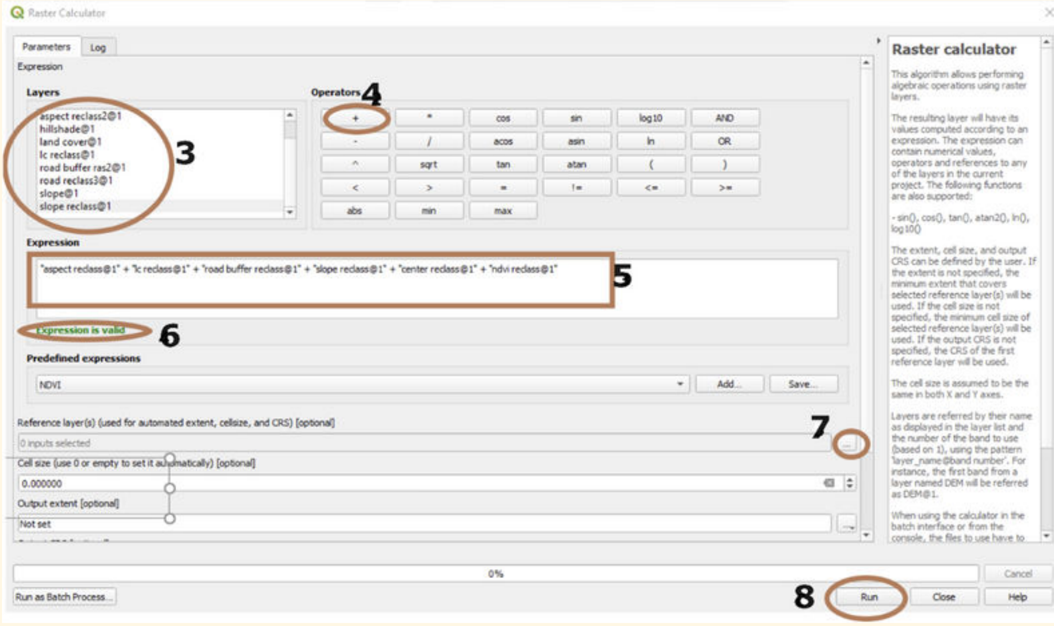

Figure 154. Final Analysis Raster Calculator

The resulting layer from this process will vary depending on your chosen center point from the activity folder.

Exercise 5

Exercise 5: Reclassifying Satellite Images

Duration	Purpose of Learning
30 minutes	• To visually represent the land cover of satellite images by reclassifying satellite raster image values

Requirements:

- QGIS (latest most stable version)
- Laptop/Desktop
- Lesson 10: Reclassifying Satellite Images from the Geospatial Training Manual on Green Assessment for Ecosystems Disaster Mapping
- Pre-event and post-event NDVI raster layers (extracted raster bands)
- Semi- Automatic Classification Plugin

Expected Output:

- Reclassified pre-event and post-event raster layers into 8 NDVI classes to represent land cover

About this Exercise

This activity focuses on the merging of the downloaded satellite images using QGIS and how these can be represented as *infrared color* or *true color* using different raster band colors. This activity also aims to extract only the necessary bands for NDVI for a more efficient processing. There are three methods for raster band extraction that can be used for this activity such as a *semi-automatic classification* plugin, raster calculator and rearrange band tool in QGIS.

Instructions

1. Load the satellite images in QGIS
2. Compute for the NDVI values for both the Pre- and Post-Odette using the raster calculator
3. Observe the range of values for each image
4. Use the appropriate style for visualizations
5. Stack the 2 NDVI images to visualize where the change occurred
6. For a detailed guide for steps 1-5, refer to *Lesson 10. Reclassifying Satellite Images.*

Lesson 11
Reclassifying Satellite Image Values

Duration	Purpose of Learning
30 minutes	• To visually represent the land cover of satellite images by reclassifying satellite raster image values

Requirements:

- Lecture with powerpoint presentation, on-the fly demonstration of image downloading and hands-on activity

Satellite images downloaded will be reclassified based on their NDVI values to compare the NDVI that occurred due to *Odette* using image stacking.

NDVI Image Stacking

Our NDVI values range from -1 to 1. In this activity we will reclassify their values into categories so we can visualize them easier for analysis without calculating NDVI difference using the Semi-Automatic Calculation Plugin.

1. Load the pre-Odette (2021) NDVI and post-Odette (2022) NDVI satellite images that you previously computed using the *Raster Calculator*. Observe the range of values for each image. Use the appropriate style for visualizations using the symbology tab in the layer's properties.
2. Open the SCP plugin.
3. If the layers are not yet visible on the SCP window, click on the *refresh button*.
4. In the SCP window, click Band set.
5. Select the pre-event single band first.
6. Click on the plus button to add the layer to the *Band set* panel.
7. Click on the post-event single band this time from the *Single Band List*.
8. Click on the plus button to add to the Band set panel.
9. Make sure that during the restacking, the pre-event is positioned above the post-event in the *Band Set* list to visualize where the changes occurred.
10. Check the "Create raster of band (stack bands)"
11. Click *Run*

Continue

Band 1: represents the 2021 NDVI (pre-Odette)

Band 2: represents the 2022 NDVI (post-Odette)

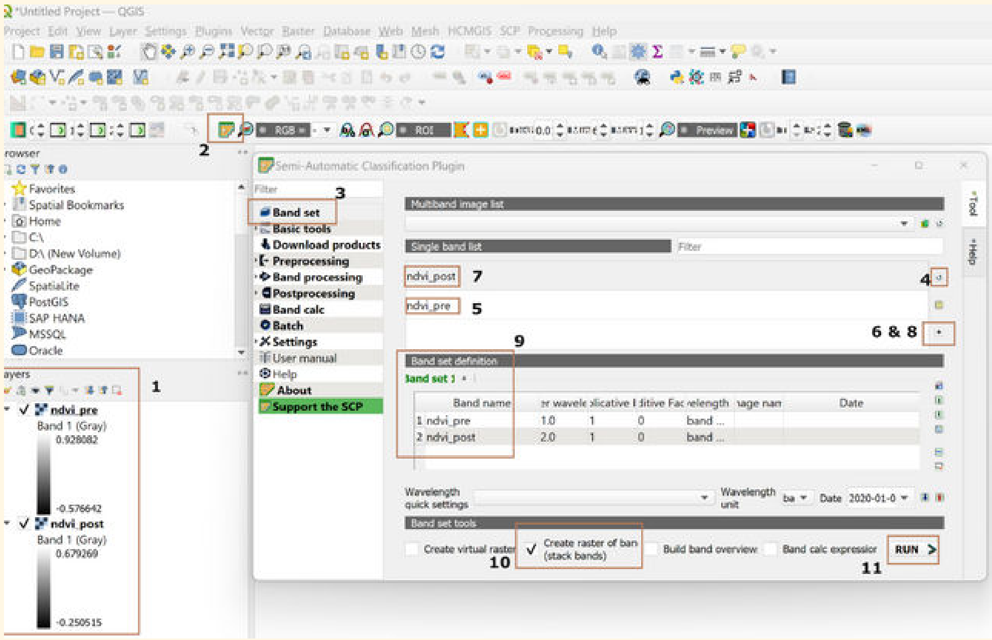

Figure 155. NDVI Image Stacking

12. On the image properties of the output stack image, click the symbology tab and designate Band 1 for the Red band, Band 2 for Green Band, and Band 2 for Blue band, copy the min and max values in the Green band to the blue band.

Band 1: represents the 2021 NDVI (pre-Odette)
Band 2: represents the 2022 NDVI (post-Odette)

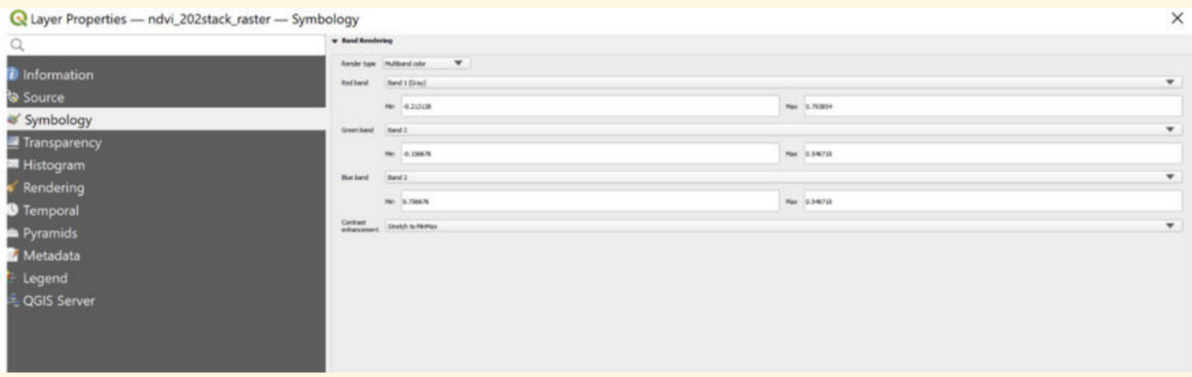

Figure 156. Stacked NDVI Layer Symbology

NDVI Difference (after image stacking)

The resulting image composite from image stacking should look like the image below. The red colored areas indicate where NDVI values decreased from year 1 to year 2. The cyan colored areas indicate where NDVI values increase from year 1 to year 2. And neutral white colored areas indicate that there is no significant change in NDVI values from year 1 to year 2.

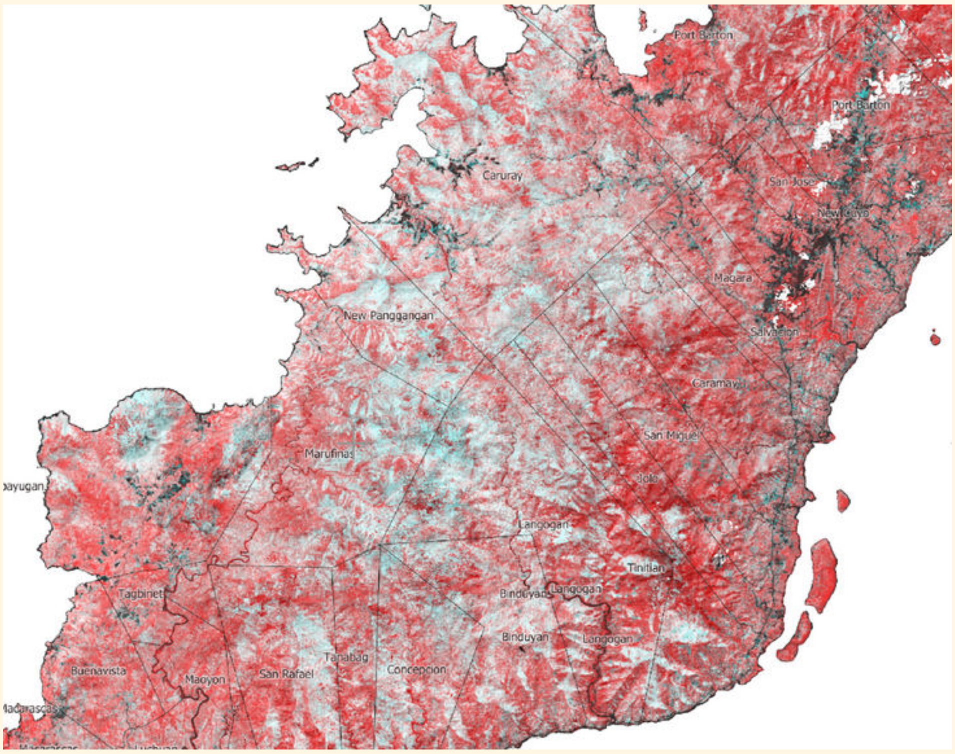

Figure 157. NDVI Difference after Image Stacking

To better gauge the NDVI value range, we can reclassify the NDVI values into categories. The table below shows the NDVI range values and its corresponding possible land cover class. Changes in these values in the post-event would indicate land cover transformation or damage and will need to be ground validated

Table 9

Table 9. NDVI Range of Values and Corresponding Symbology and Land Classification

Symbology	NDVI Range of Values	Land Classification
	< 0.17	inactive cropland, settlements or barren land
	0.18 - 0.33	
	0.34 - 0.48	cropland, grassland or non-forest vegetation
	0.49 - 0.51	cropland, grassland or non-forest vegetation
	0.52 - 0.67	mixed vegetation or less dense forest
	0.68 - 0.73	
	0.74 - 0.8	moderately dense forest
	> 0.8	dense forest

Reclassifying NDVI values to 8 Land Cover Classes

To visualize the range values assigned on the land cover classes in Table 5, we can resample our pre-event and post-event NDVI using the raster calculator. You may access the ready-made expression for these ranges in the reclass_range_ndvi_raster_calculator text file of your exercise folder.

Here are the steps to reclass the NDVI values to 8 land cover classes.

1. Make sure that the pre-event and post-event NDVI layers are loaded in the QGIS project.
2. Search 'raster calculator' from the Processing toolbox.
3. In the *Raster Calculator* window, paste the reclassification formula on the *Expressions* tab. Use the ndvi_pre formula if you are computing for pre-event while use the ndvi_post formula when computing for post-event.

Continue

The formulas used to reclassify the values for the pre-event and post-event NDVI are the following:

Pre-event reclassification formula

("ndvi_pre@1" <= .1744)*1+("ndvi_pre@1"<= .3273 AND
"ndvi_pre@1">.1744)*2+("ndvi_pre@1" <= .4802 AND
"ndvi_pre@1">.3273)*3+("ndvi_pre@1" <= .513 AND
"ndvi_pre@1">.4802)*4+("ndvi_pre@1" <= .67 AND
"ndvi_pre@1">.513)*5+("ndvi_pre@1" <= .73 AND
"ndvi_pre@1">.67)*6+("ndvi_pre@1" <= .8 AND
"ndvi_pre@1">.73)*7+("ndvi_pre@1">.8)*8

Post-event reclassification formula

("ndvi_post@1" <= .1744)*1+("ndvi_post@1"<= .3273 AND
"ndvi_post@1">.1744)*2+("ndvi_post@1" <= .4802 AND
"ndvi_post@1">.3273)*3+("ndvi_post@1" <= .513 AND
"ndvi_post@1">.4802)*4+("ndvi_post@1" <= .67 AND
"ndvi_post@1">.513)*5+("ndvi_post@1" <= .73 AND
"ndvi_post@1">.67)*6+("ndvi_post@1" <= .8 AND
"ndvi_post@1">.73)*7+("ndvi_post@1">.8)*8

Note: The formulas listed above are only valid if your NDVI layers are named the same. Should you wish to use this formula, rename your NDVI layers to the exact layer names in the formula.

4. Select the pre-event or post-event layer as your reference layer for the extent, cell size and CRS.
5. Set the file name and location folder of your output file.
6. Click *Run*.

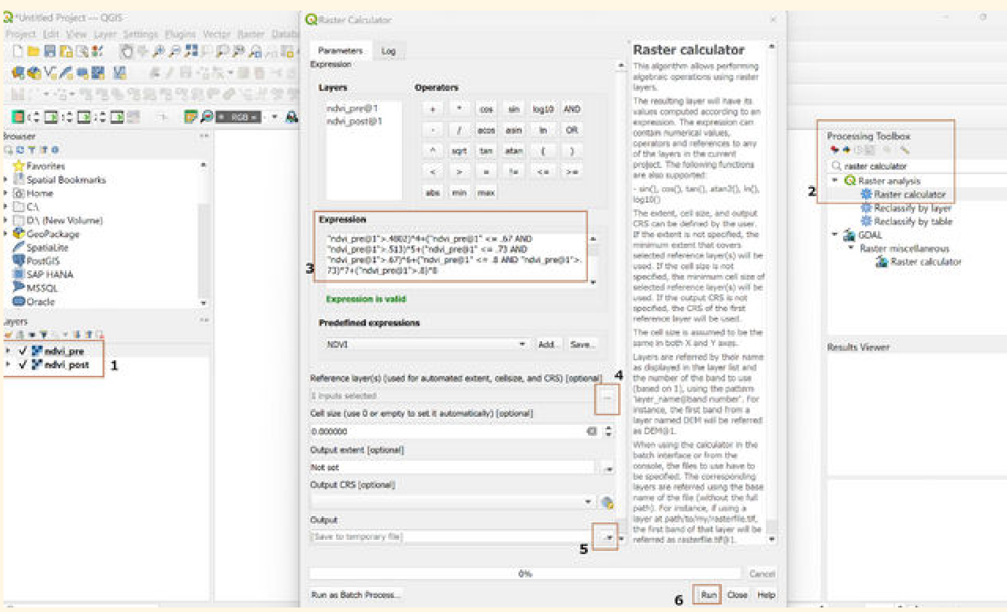

Figure 158. Reclassifying NDVI values to 8 Land Cover Classes

7. Use the .qml file provided in the exercise folder to symbolize the reclassified NDVI layers. Open the symbology of the reclassified NDVI layer.
8. In the *Symbology* window click Style and select Load Style.
9. In the *Load layer* properties from the style file window that will prompt, look for the location of the .qml file. Click on the .qml file.
10. Click *Open* in the *Load layer* properties from the style file window.
11. Click *Ok* from the Symbology window.

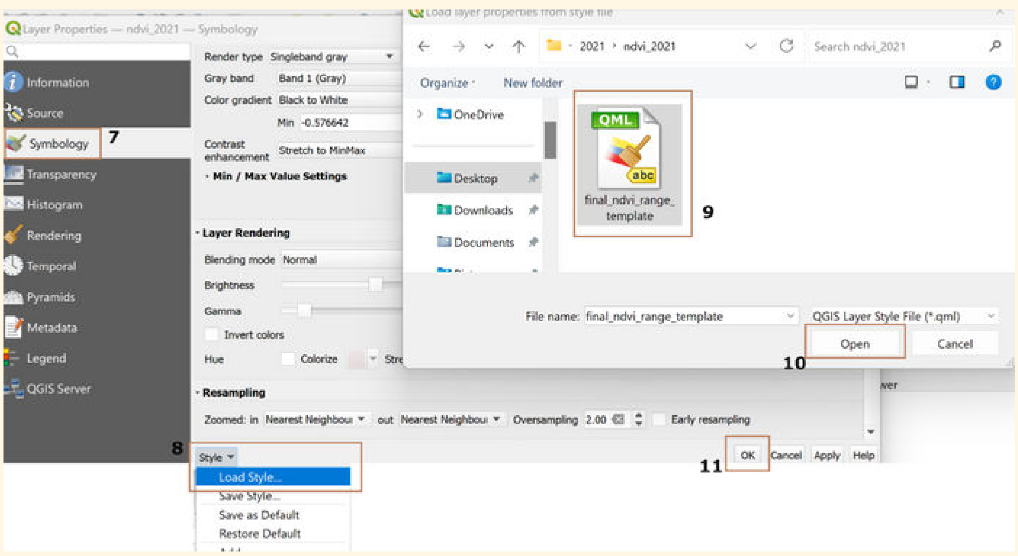

Figure 159. NDVI Symbology

However, if you do not have any .qml file available you can still recreate the same symbology by using the HTML notation of colors per category listed on the table below:

Table 10. NDVI Reclassified Values and their Corresponding HTML Notations

NDVI Reclassified Value	HTML Notation of Color
1	#d7cece
2	#beb0ac
3	#feba6e
4	#ffe8a4
5	#e7f6b8
6	#44e20b

Table 10. NDVI Reclassified Values and their Corresponding HTML Notations

NDVI Reclassified Value	HTML Notation of Color
7	#92cb76
8	#2b8316

From the previous -1 to 1 range of values of the pre-Odette and post-Odette NDVI, the images are now categorized into eight classes.

Figure 160. Pre- Odette Reclassified NDVI (2021)

Figure 161. Post- Odette Reclassified NDVI (2022)