

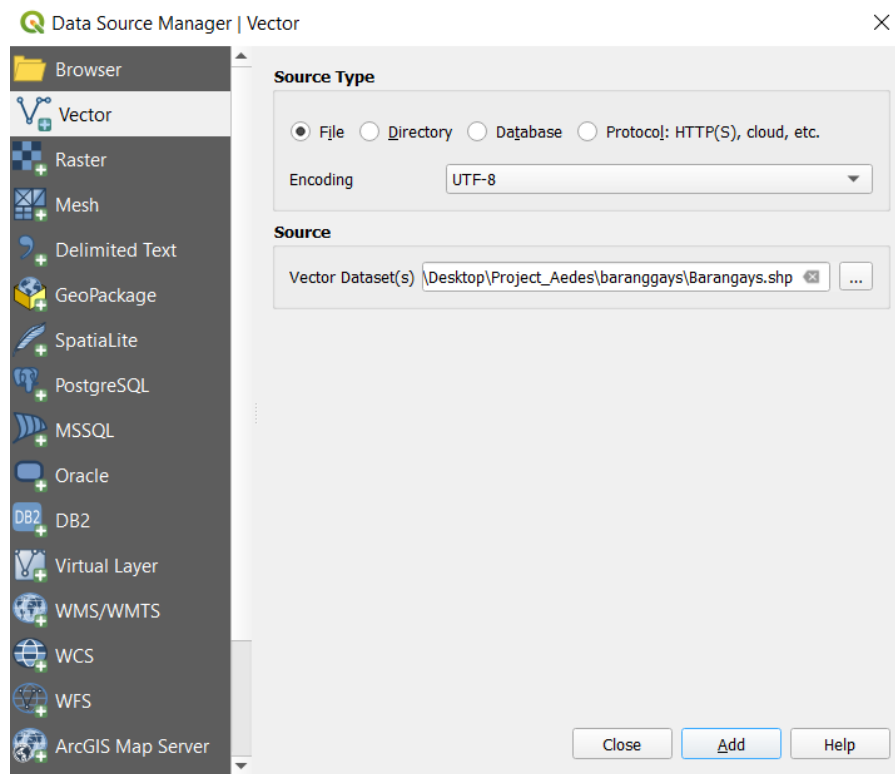
Determining Potential Dengue Hotspots using Sentinel-2 Satellite Data and QGIS

Scope: This document provides a step-by-step procedure on how to acquire and process Sentinel-2 band satellite data using QGIS 3.4 to determine stagnant water locations in the specified city. The generated output is a CSV file which contains the coordinates of these potential Dengue hotspots computed from the FAPAR and NDWI of the satellite image.

1. Creating the QGIS Project for the City

- 1.1. Create a new folder for the project in Windows Explorer (note: you can assign the **CityName** as folder name)
- 1.2. Open **QGIS 3.4** and click **Project > New**
- 1.3. Click **Project > Save as**, go to the new folder you've just created and type **CityName.qgz** (note: you now have a blank project for the city)
- 1.4. Import **Barangays.shp** (note: download this file from PhilGis.org if not yet available) by clicking on **Layer > Data Source Manager > Vector**. Fill out the fields as shown, then click **ADD** and **CLOSE**

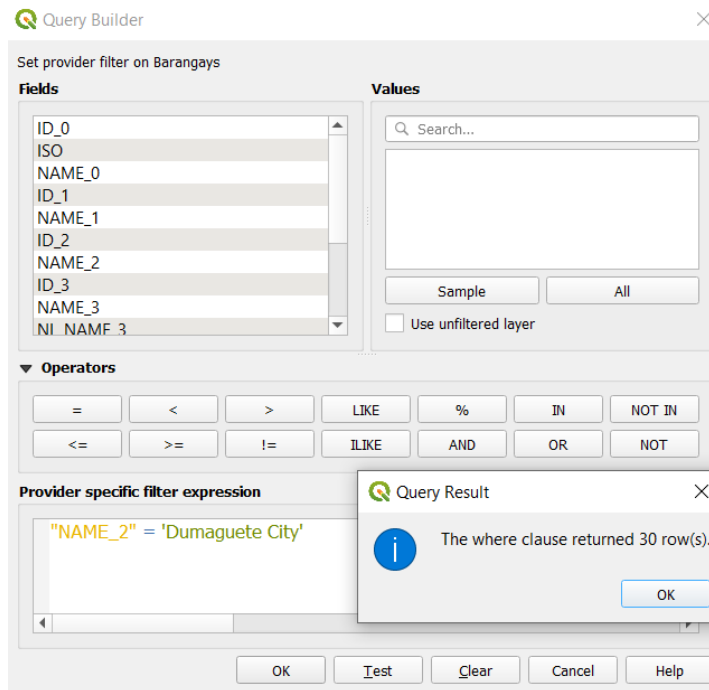
QGIS Screenshot 1: Setting up the Philippine Barangays



Expected Output: Philippine image in Map window and Layer named **Barangay** will appear in Layers window (see in QGIS window)

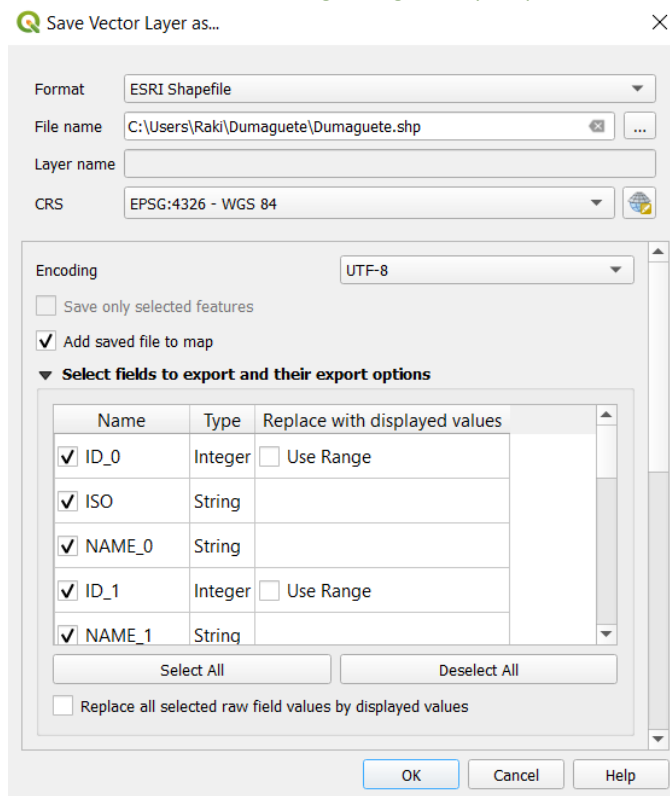
- 1.5. In the **Layers** window, right click on **Barangays** and choose **Properties**
- 1.6. Under **Layer Properties > Source**, click on **Query Builder** and fill out as shown (note: **Name_2** field of Barangay corresponds to the city name). Click **TEST** and **OK**.

QGIS Screenshot 2: Setting up the City

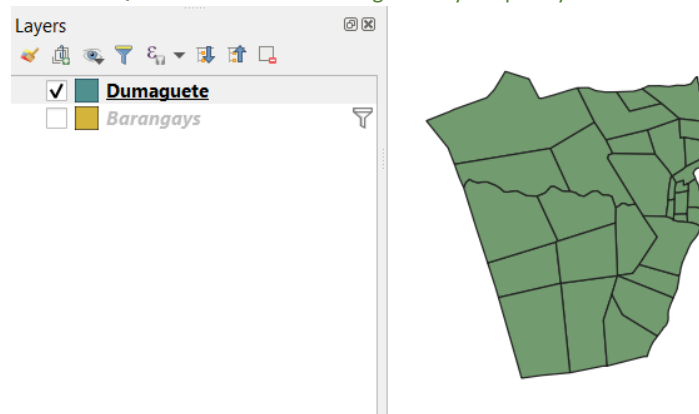


- 1.7. Under [Layer Properties > Source](#) again, click [APPLY](#) and [OK](#).
- 1.8. In the [Layers](#) window again, right click on [Barangays](#) and choose [Export > Save Features As](#). Fill out the fields as shown then click [OK](#)

QGIS Screenshot 3: Creating/Saving the City Shape File



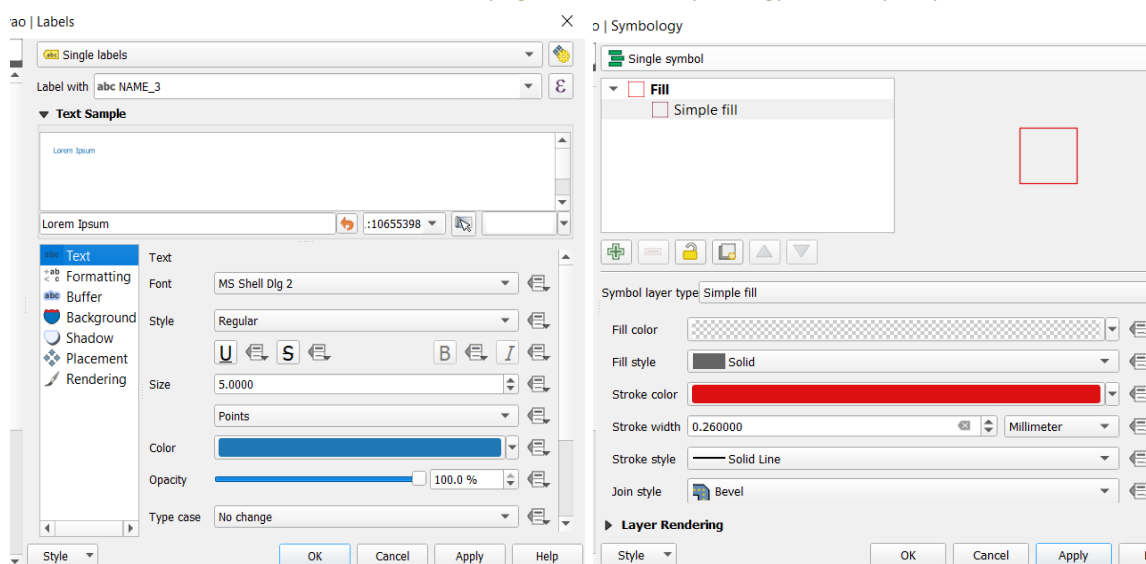
QGIS Screenshot 4: Loading the City Shape Layer



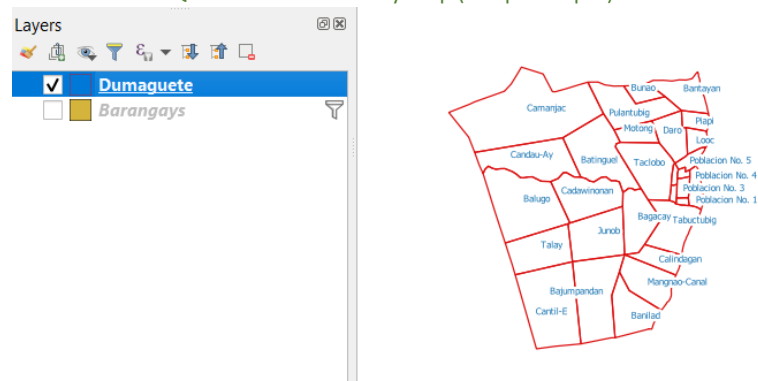
Expected Output: new file **CityName.shp** (see in project folder), **CityName** layer in the Layer window and city map (see in QGIS window)

- 1.9. In the **Layers** window again, right click on **CityName** and choose **Properties**. Set **Labels** as shown then click **APPLY**. Set **Symbology** as shown then click **APPLY**. Click **OK**

QGIS Screenshots 5 and 6: Modifying the Labels and Symbology of the City Shape File



QGIS Screenshot 7: City Map (sample output)



Expected Output: reformatted City map with barangay names (see in QGIS window)

- 1.10. Save the project by clicking **Project > Save** (note: you now have a project with city map and layer)

2. Downloading Satellite Images of the City

- 2.1. Click on **SCP** then **Download Products** and fill out Login data as shown (note: you should create your Sentinel account in scihub.copernicus.eu before this step). Do not click **RUN** yet.

QGIS Screenshot 8: SCP Login Data

The screenshot shows the 'Login data' tab of the SCP interface. It contains three login sections: 'Login https://ers.cr.usgs.gov', 'Login https://urs.earthdata.nasa.gov', and 'Login Sentinel'. Each section has fields for 'User' and 'Password', and a 'remember' checkbox. The 'User' field for Sentinel is 'im_sen2x'. At the bottom, there are checkboxes for 'Only if preview in Layers', 'Preprocess images', and 'Load bands in QGIS', along with a 'RUN' button.


- 2.2. Still under **SCP > Download products**, set **Download options** as shown (note: only Sentinel-2 bands 3, 4, 5 and 8 should be selected). Do not click **RUN** yet.

QGIS Screenshot 9: SCP Download options

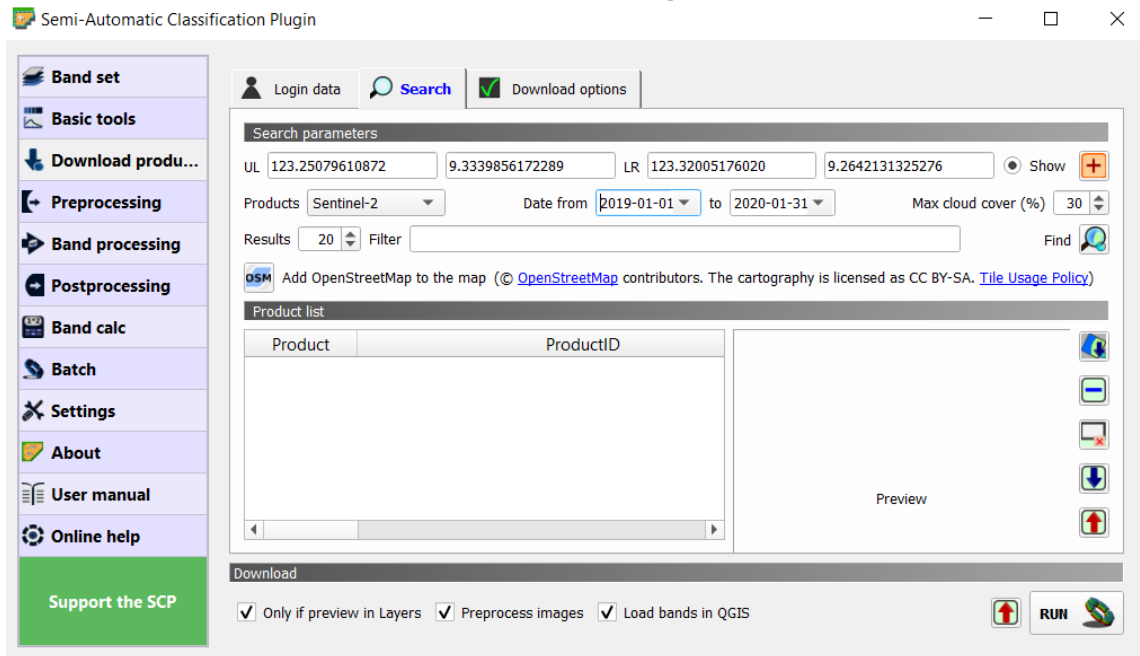
The screenshot shows the 'Download options' tab of the SCP interface. It contains three sections for selecting bands: 'Landsat bands', 'Sentinel-2 bands', and 'Sentinel-3 bands'. Each section has checkboxes for individual bands and an 'Ancillary data' checkbox. In the 'Sentinel-2 bands' section, bands 3, 4, 5, and 8 are selected. At the bottom, there are checkboxes for 'Only if preview in Layers', 'Preprocess images', and 'Load bands in QGIS', along with a 'RUN' button.

- 2.3. Still under **SCP > Download products**, fill out **Search** as shown and then click **FIND**. Do not click **RUN** yet.

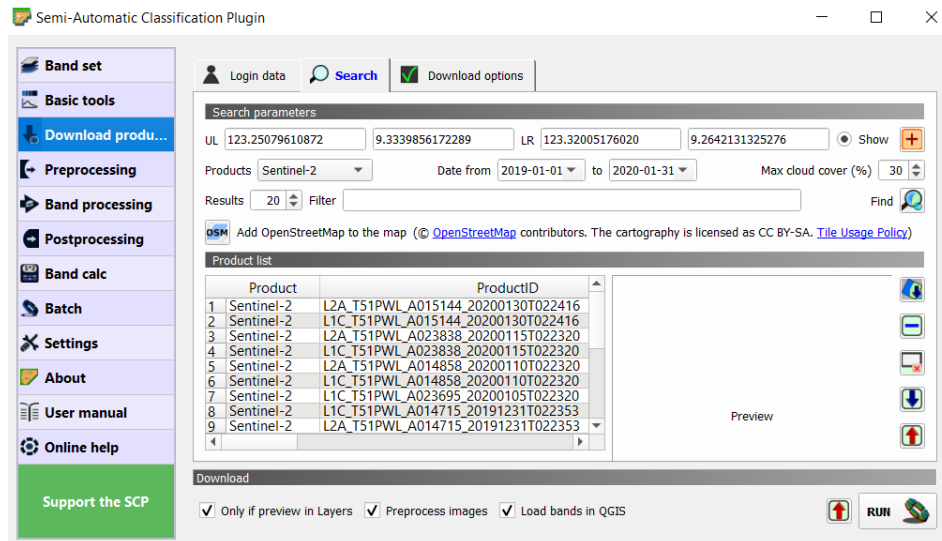
notes:

1. Max cloud cover may be set to 30% - 50% to acquire a good satellite image
2. Date from and To are randomly selected (you may set to start and end of a specific year)
3. UL and LR correspond to the Upper-Left and Lower-Right coordinates [Long, Lat] of the city which may be acquired from maps.google.com OR by clicking the  button then clicking a rectangular area in the Map window

QGIS Screenshot 10: SCP Finding the Satellite



QGIS Screenshot 11: SCP Product List




Expected output: Product list will display satellite data for the specified city and dates

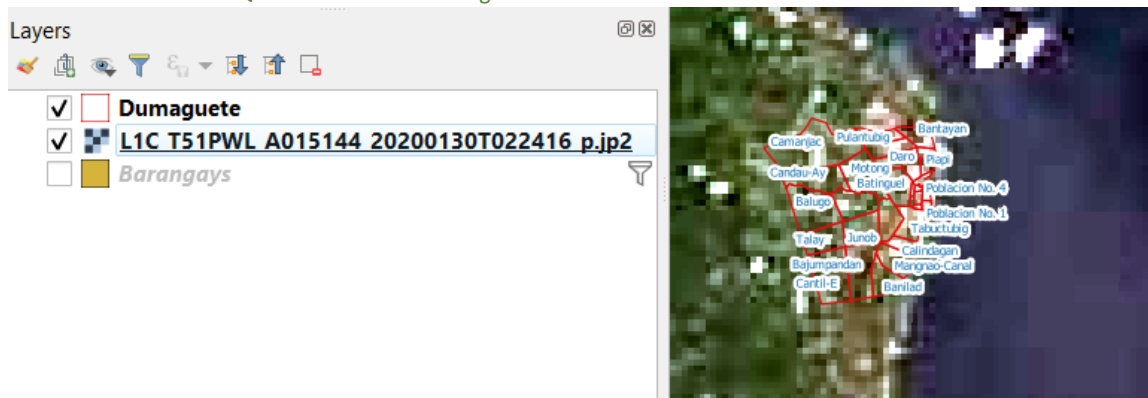
- 2.4. Look at the **Product list**, click on the Sentinel-2 Product with low CloudCover. This will load the preview image at the right. (note: you may need to try a few product no. before you can choose the one with the best image).

QGIS Screenshot 12: SCP Selecting the Satellite with Low CloudCover

Product list						
Product	ProductID	AcquisitionDate	CloudCover	Zone/Path	Row/	
1 Sentinel-2	L1C_T51PWL_A015144_20200130T022416	2020-01-30T02:...	7.5144	51PWL		
2 Sentinel-2	L1C_T51PWL_A014858_20200110T022320	2020-01-10T02:...	9.8228	51PWL		
3 Sentinel-2	L1C_T51PWL_A023552_20191226T022320	2019-12-26T02:...	12.3027	51PWL		
4 Sentinel-2	L1C_T51PWL_A014143_20191121T022323	2019-11-21T02:...	12.5434	51PWL		
5 Sentinel-2	L1C_T51PWL_A022408_20191007T020655	2019-10-07T02:...	12.659	51PWL		
6 Sentinel-2	L1C_T51PWL_A013714_20191022T021956	2019-10-22T02:...	15.4285	51PWL		
7 Sentinel-2	L1C_T51PWL_A014715_20191231T022353	2019-12-31T02:...	16.7609	51PWL		
8 Sentinel-2	L1C_T51PWL_A014143_20191121T022453	2019-11-21T02:...	17.0372	51PWL		
9 Sentinel-2	L2A_T51PWL_A015144_20200130T022416	2020-01-30T02:...	18.2663	51PWL		
10 Sentinel-2	L2A_T51PWL_A014143_20191121T022323	2019-11-21T02:...	18.3371	51PWL		
11 Sentinel-2	L2A_T51PWL_A014858_20200110T022320	2020-01-10T02:...	20.1899	51PWL		
12 Sentinel-2	L2A_T51PWL_A022408_20191007T022457	2019-10-07T02:...	21.5072	51PWL		
13 Sentinel-2	L2A_T51PWL_A023552_20191226T022320	2019-12-26T02:...	21.5255	51PWL		
14 Sentinel-2	L1C_T51PWL_A023838_20200115T022320	2020-01-15T02:...	21.5266	51PWL		
15 Sentinel-2	L1C_T51PWL_A023695_20200105T022320	2020-01-05T02:...	21.6389	51PWL		
16 Sentinel-2	L2A_T51PWL_A014715_20191231T022353	2019-12-31T02:...	24.198	51PWL		
17 Sentinel-2	L2A_T51PWL_A023838_20200115T022320	2020-01-15T02:...	24.6206	51PWL		
18 Sentinel-2	L2A_T51PWL_A013714_20191022T021956	2019-10-22T02:...	26.0042	51PWL		
19 Sentinel-2	L2A_T51PWL_A022408_20191007T020655	2019-10-07T02:...	26.2652	51PWL		
20 Sentinel-2	L2A_T51PWL_A014143_20191121T022453	2019-11-21T02:...	26.8152	51PWL		

- 2.5. Once the best Product has been chosen (highlighted in blue), click  to preview the image in the Main Window

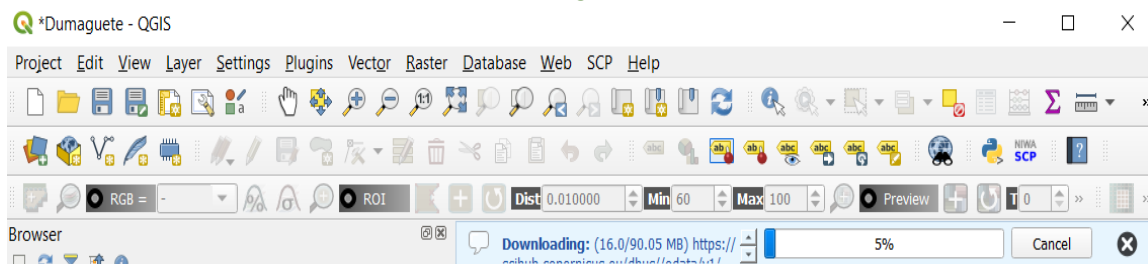
QGIS Screenshot 13: Image Preview of the Selected Satellite Data



Expected output: The blurred image of the city will appear in the Map and the corresponding JP2 will appear in the Layers window

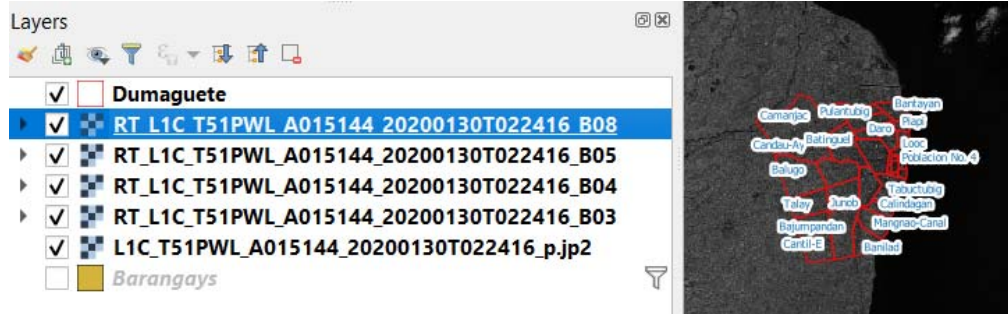
- 2.6. Go back to **SCP > Download products > Search**, with **only** the selected Sentinel-2 JP2 appearing in the main window (see previous screenshot), you may now click **RUN** (note: make sure to remove other image previews [JP2 layers] in the project, as all these data will also be downloaded). Select the Project Folder where to save the images. This will start downloading the satellite images. (note: downloading of satellite images takes around 1 to 2 hours). To check the status of Download, look at the QGIS Main window.

QGIS Screenshot 14: Downloading the Selected Satellite Data



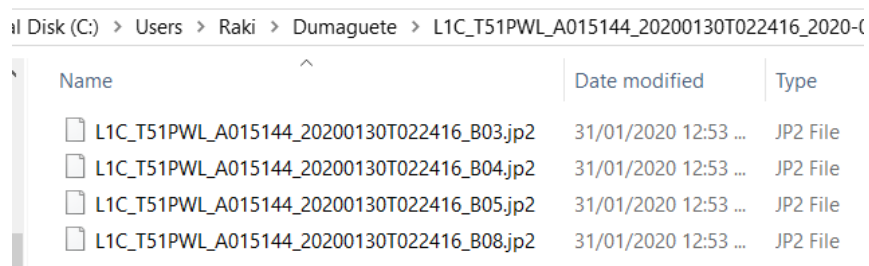
2.7. After completion of download, confirm by checking the [Layers](#) window and the Project Folder

QGIS Screenshot 15: Layers Window with the Downloaded B03, B04, B05 and B08 Images




Expected Output: The 4 Sentinel Band images (B03, B04, B05 and B08)

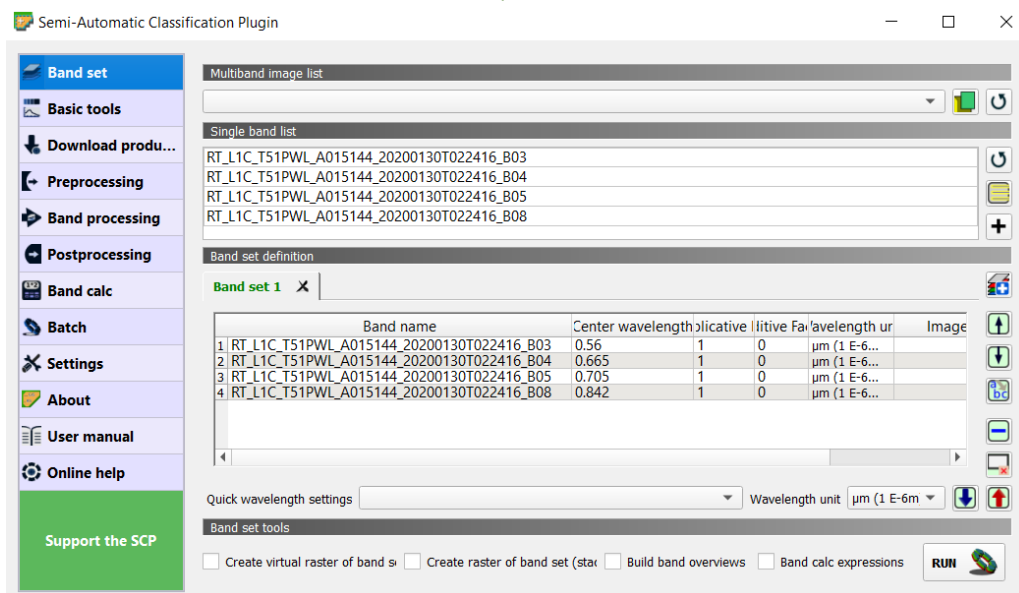
QGIS Screenshot 16: Project Folder with the Downloaded B03, B04, B05 and B08 jp2 Files




Expected Output: These 4 JP2 files are located inside the Project Folder

2.8. Under [SCP > Band Set](#), check that the 4 Bandset images are available. Refresh the window by clicking the  button under [Single band list](#)

QGIS Screenshot 17: Updated SCP Band Set

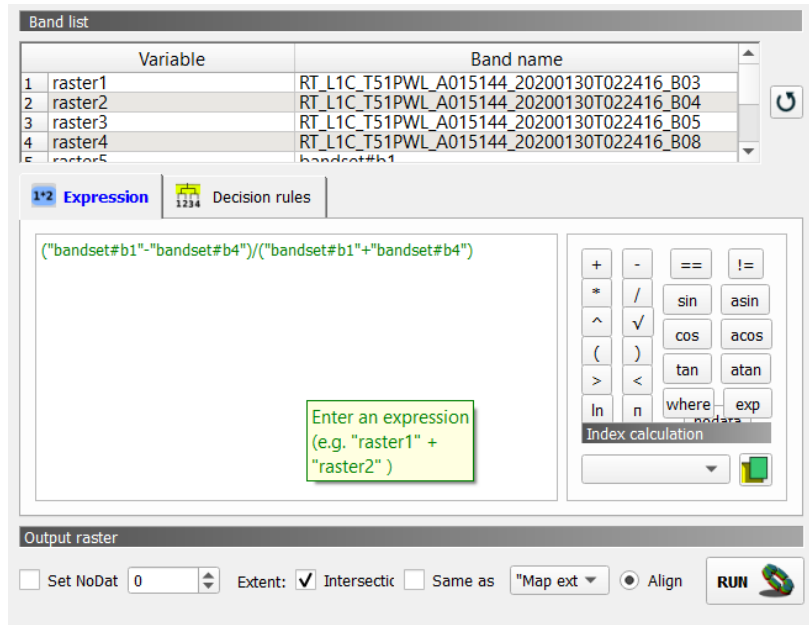


3. Processing the Satellite Images

- 3.1. Go to **SCP > Band calc**, click on the Refresh button  to update the Band list
- 3.2. To calculate **NDWI**, paste the following formula in **Expression**

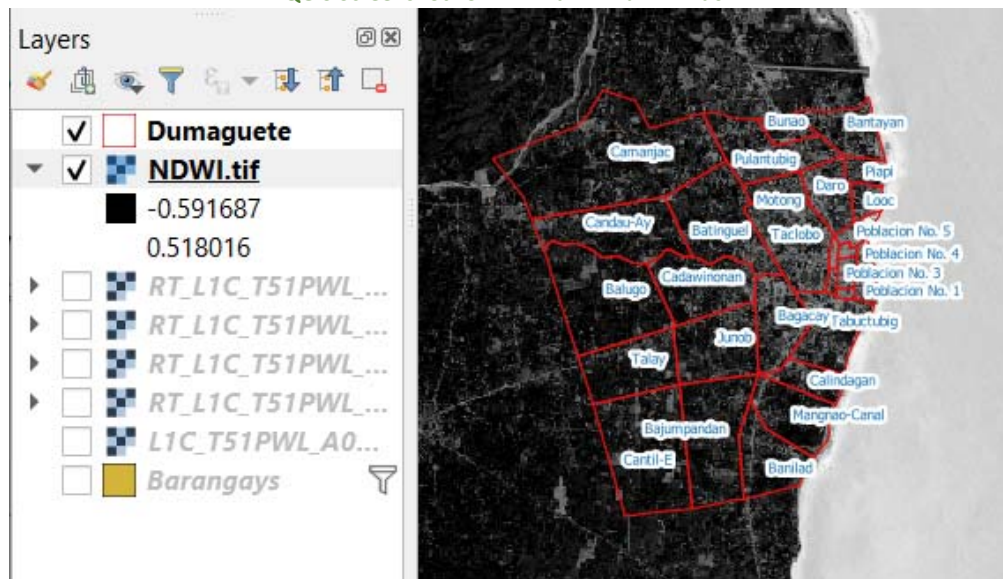
$$("bandset\#b1" - "bandset\#b4") / ("bandset\#b1" + "bandset\#b4")$$

QGIS Screenshot 18: SCP Band calc for NDWI



- 3.3. Click **RUN** and **Save the Raster output** as **NDWI.tif**

QGIS Screenshot 19: NDWI.tif in Main Window

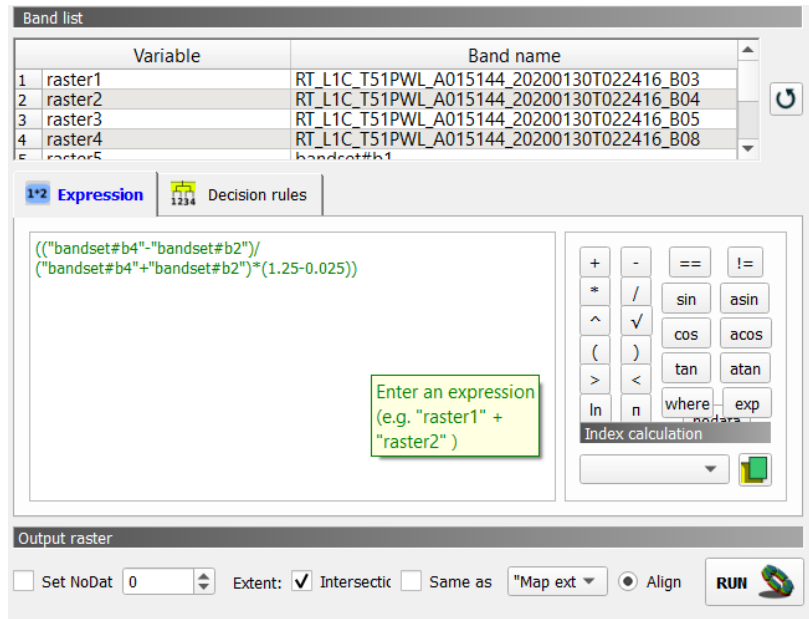


Expected Output: NDWI.tif in Project Folder and NDWI Layer and Image

- 3.4. After NDWI, calculate **FAPAR** by typing the following formula in **Expression** (still under **SCP > Band calc**)

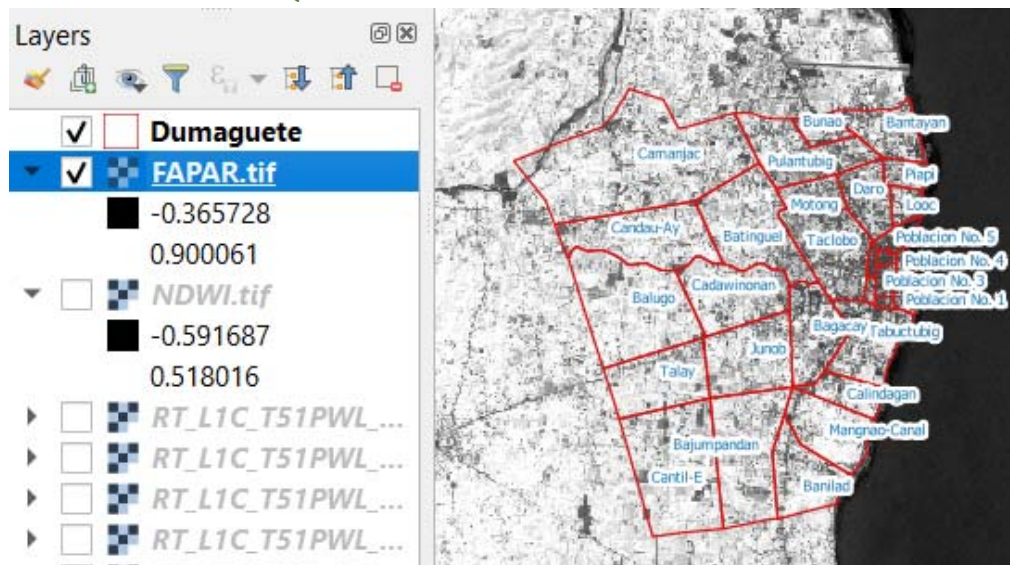
$((\text{"bandset\#b4"} - \text{"bandset\#b2"}) / (\text{"bandset\#b4"} + \text{"bandset\#b2"})) * (1.25 - 0.025))$

QGIS Screenshot 20: SCP Band calc for FAPAR



- 3.5. Click **RUN** and **Save the Raster output** as **FAPAR.tif**

QGIS Screenshot 21: FAPAR.tif in Main Window

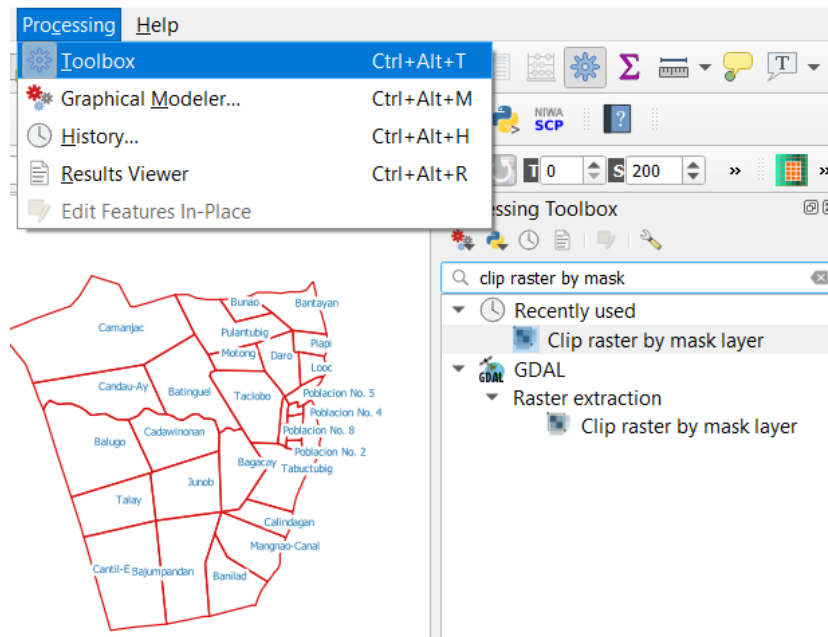


Expected Output: FAPAR.tif in Project Folder and FAPAR Layer and Image

- 3.6. Click on **Project > Save**. (note: it is advisable to save the project every time a new data or image is generated)

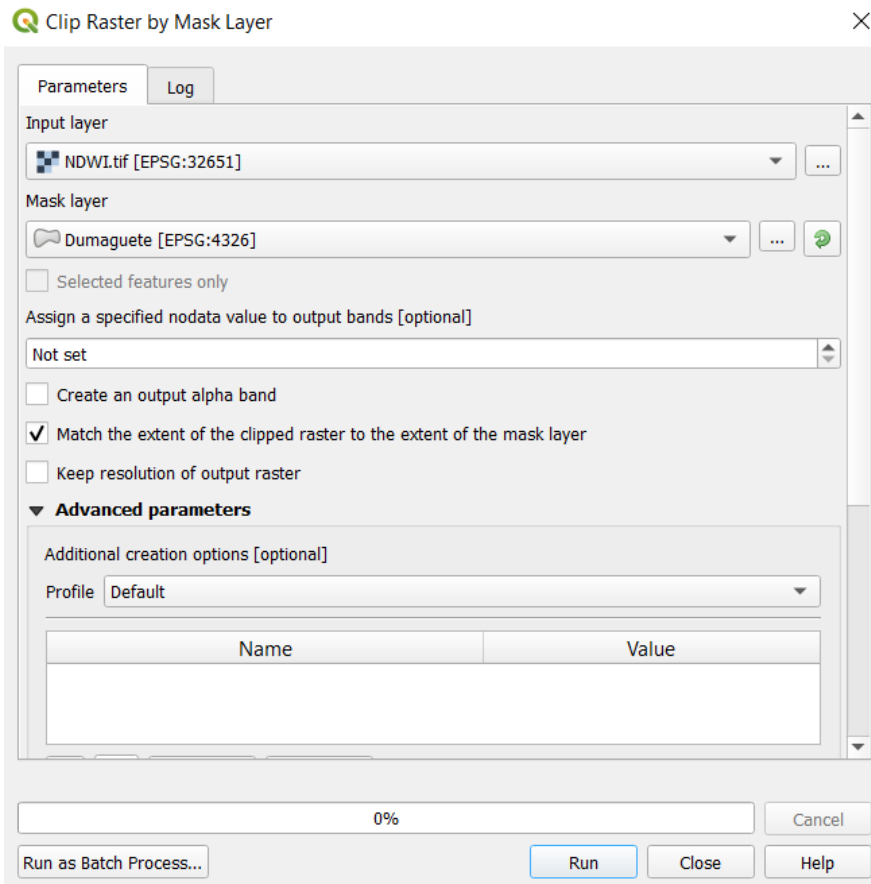
3.7. Click on **Processing > Toolbox**, search for and click “**Clip raster by mask layer**”

QGIS Screenshot 22: Searching for Clip Raster by Mask Layer



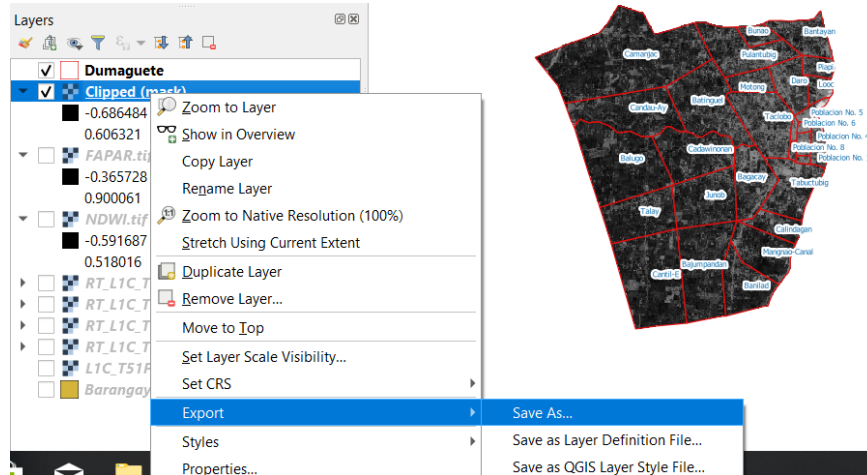
3.8. Under **Clip Raster by Mask Layer**, set the **Parameters** as shown and click **RUN**.

QGIS Screenshot 23: Generating NDWI_clipped Image

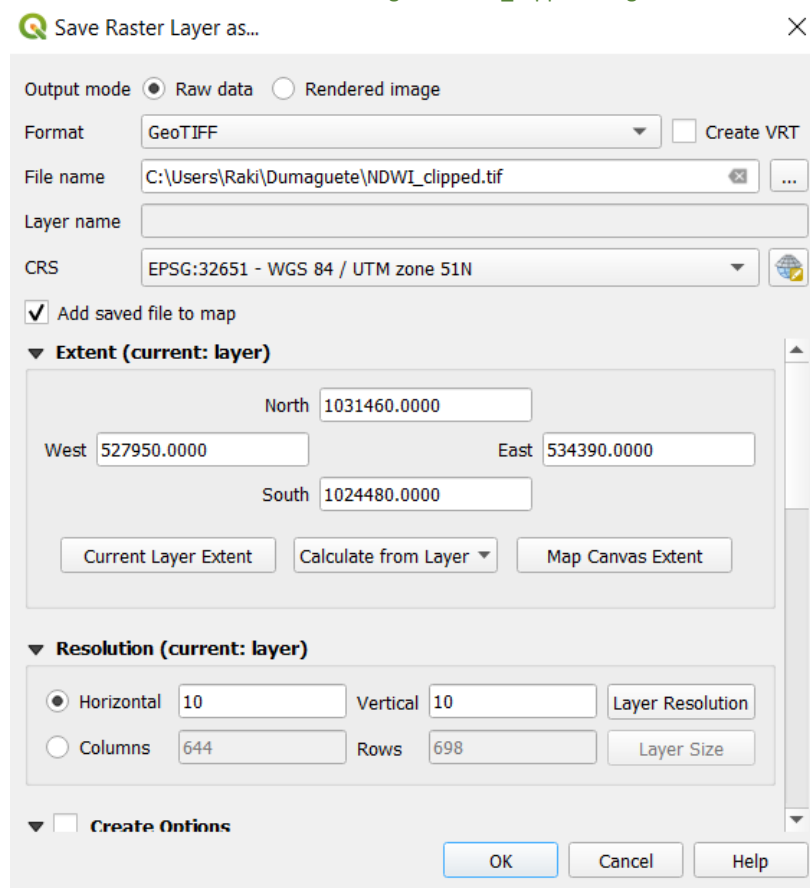


- 3.9. Check the **Layers** window, right click on **Clipped (mask)**, then **Export > Save As**. This will open the **Save Raster Layer** window. Save as **NDWI_clipped.tif**, click **OK**.

QGIS Screenshot 24: Exporting the Clipped Mask

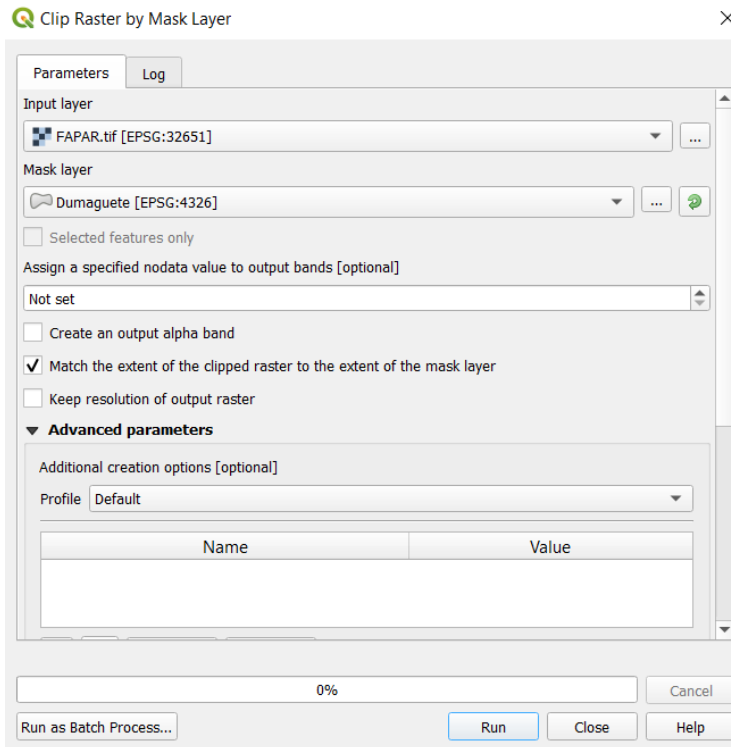


QGIS Screenshot 25: Saving the NDWI_clipped Image



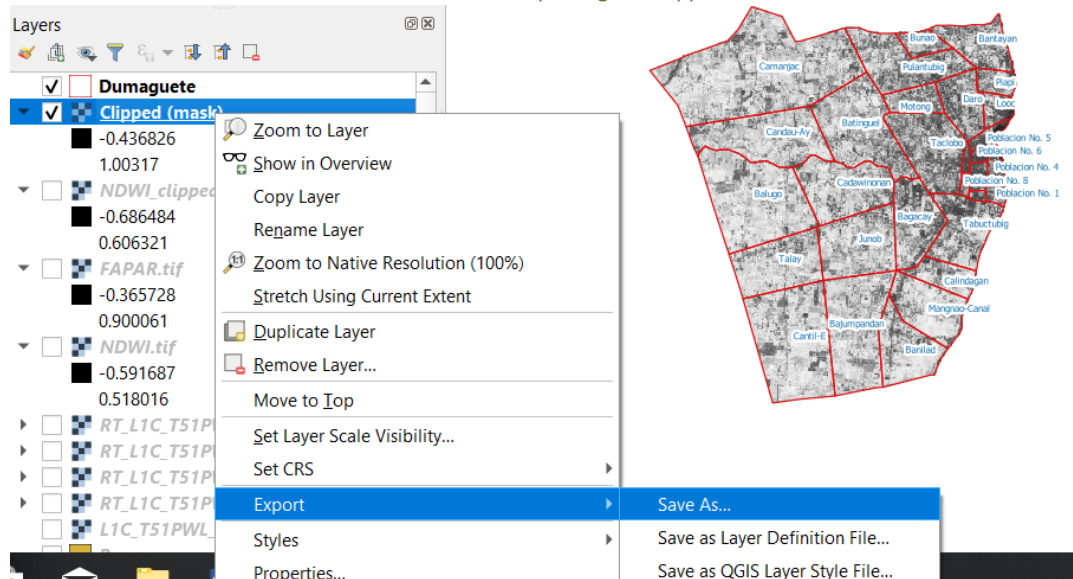
- 3.10. Do the same for FAPAR. Under **Clip Raster by Mask Layer**, set the **Parameters** as shown and click **RUN**.


QGIS Screenshot 26: Generating FAPAR_clipped Image



- 3.11. Check the **Layers** window, right click on **Clipped (mask)**, then **Export > Save As**. This will open the **Save Raster Layer** window. Save as **FAPAR_clipped.tif**, click **OK**.

QGIS Screenshot 27: Exporting the Clipped Mask



 Save Raster Layer as...

Output mode ☒ Raw data ☐ Rendered image

Format GeoTIFF ☐ Create VRT

File name C:\Users\Raki\Dumaguete\FAPAR_clipped.tif

Layer name

CRS EPSG:32651 - WGS 84 / UTM zone 51N

☒ Add saved file to map

▼ Extent (current: layer)

North	<input type="text" value="1031460.0000"/>	
West	<input type="text" value="527950.0000"/>	East <input type="text" value="534390.0000"/>
South	<input type="text" value="1024480.0000"/>	

▼ Resolution (current: layer)

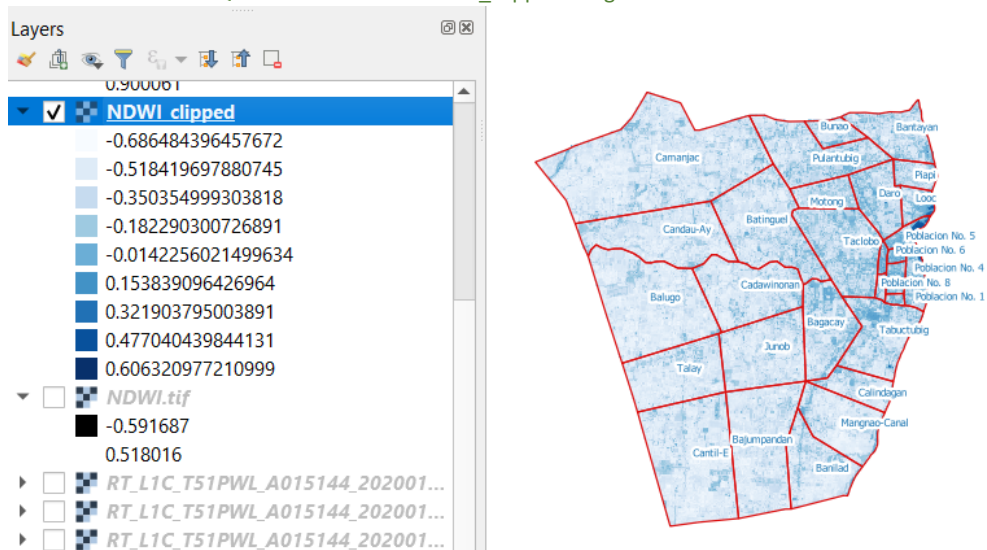
<input checked="" type="radio"/> Horizontal	<input type="text" value="10"/>	Vertical	<input type="text" value="10"/>	<input type="button" value="Layer Resolution"/>
<input type="radio"/> Columns	<input type="text" value="644"/>	Rows	<input type="text" value="698"/>	<input type="button" value="Layer Size"/>

▼ ☐ Create Options

- ### QGIS Screenshot 29: FAPAR_clipped Image with Greens



QGIS Screenshot 30: NDWI_clipped Image with Blues



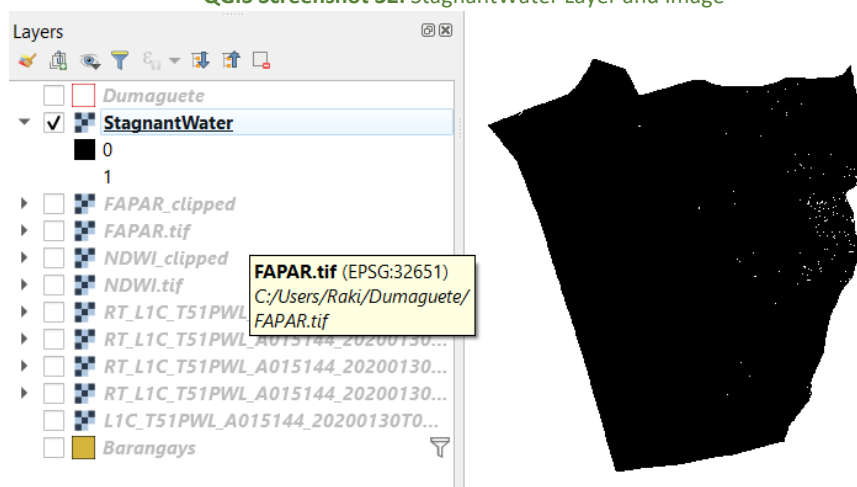
- 3.14. Compute for the Stagnant Water. Click on **Raster** then **Raster Calculator**. Type the following formula in the **Raster Calculator Expression** (click **OK** and save the file as **StagnantWater.tif**):

$((\text{"NDWI_clipped@1"} > 0.xx) \text{ AND } (\text{"FAPAR_clipped@1"} > 0.xx)) * 1$

where 0.xx is variable depending on the FAPAR/NDWI values (note: you may set to 0.10 by default)

QGIS Screenshot 31: Computing and Generating StagnantWater Image

QGIS Screenshot 32: StagnantWater Layer and Image

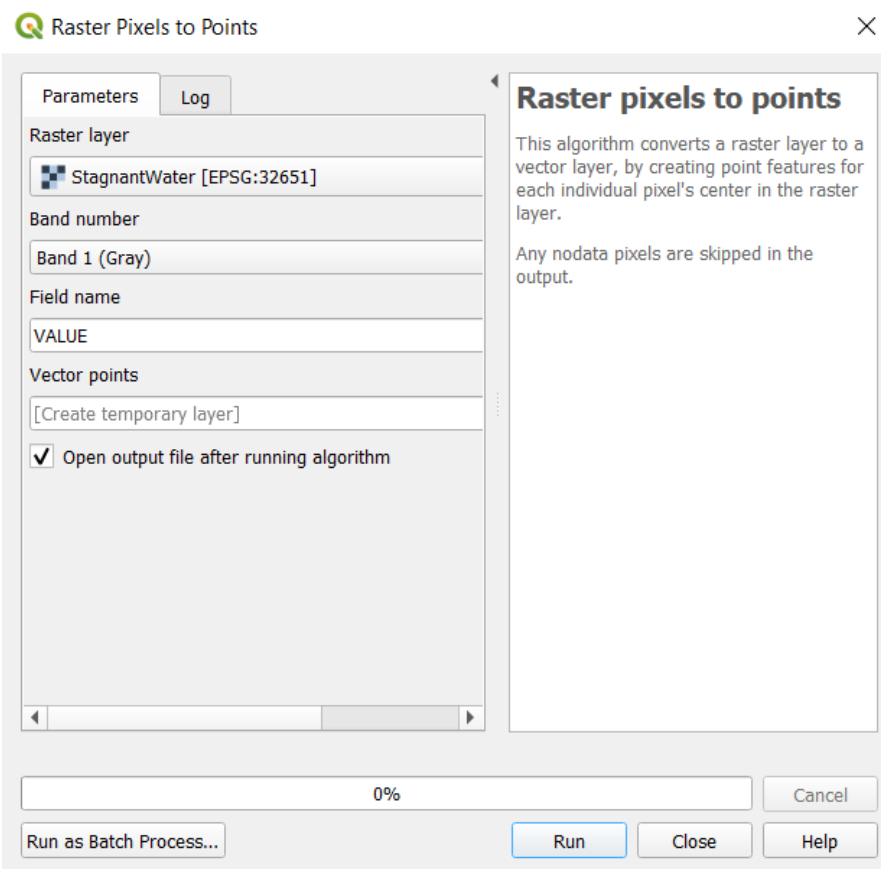


Expected Output: StagnantWater.tif in Project Folder and StagnantWater Layer and Image

4. Generating the Output Table

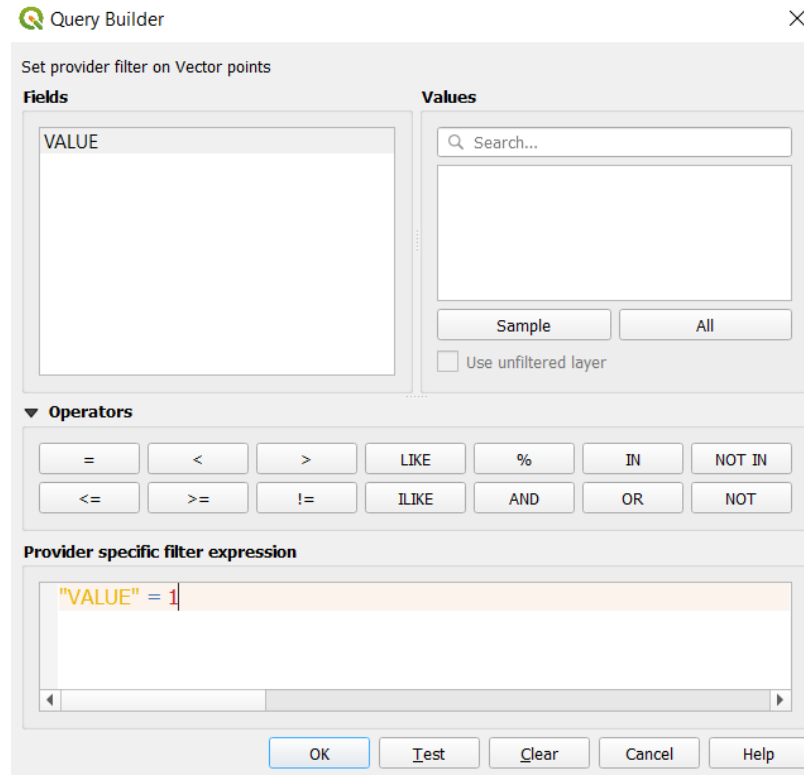
- 4.1. Under [Processing > Toolbox](#), click [Raster pixels to points](#) to convert [StagnantWater.tif](#) to Vector points. Click [RUN](#)

QGIS Screenshot 33: Converting StagnantWater Image to Vector Points



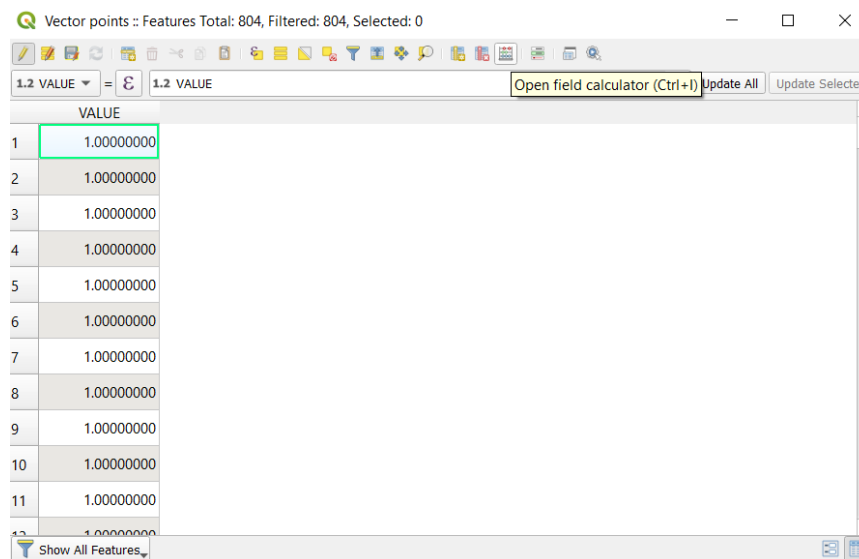
- 4.2. In the **Layer** window, right click on the generated **Vector points**, select **Properties > Source**. Click **Query Builder** and set as shown ("**VALUE**" = 1). This will filter the Stagnant Water points when generating the table (note: without filtering, the output table will include even the zero values which will make the processing very slow). Click **TEST** and **OK**.

QGIS Screenshot 34: Filtering the StagnantWater Points



- 4.3. Back in the **Layer** window, right click on the **Vector points**, select **Toggle Editing**. Right click on the **Vector points** again, select **Open Attribute Table**. Click the **Open Field Calculator** button

QGIS Screenshot 35: Vector points Attribute Table



4.4. Fill out the **Field Calculator** as shown to add the **Longitude** field. Click **OK**.

QGIS Screenshot 36: Adding the Longitude Field to the Vector Points

The screenshot shows the QGIS Field Calculator dialog. The 'Create a new field' checkbox is checked. Under this section, 'Create virtual field' is unchecked. The 'Output field name' is 'Longitude', 'Output field type' is 'Decimal number (real)', 'Output field length' is 12, and 'Precision' is 7. The 'Update existing field' checkbox is unchecked. The 'Expression' tab is selected, showing the expression: `x(transform($geometry, layer_property('output_b8b2d90b_ef86_48af_aea5_9e4c0e3f35c8','crs'),'EPSG:4326'))`. The 'Map Layers' list shows 'Vector points'. The 'Current value' is 'output_b8b2d90b_ef86_48af_aea5_9e4c0e3f35c8'. The 'Output preview' is 123.30638197805845. The 'OK' button is highlighted.

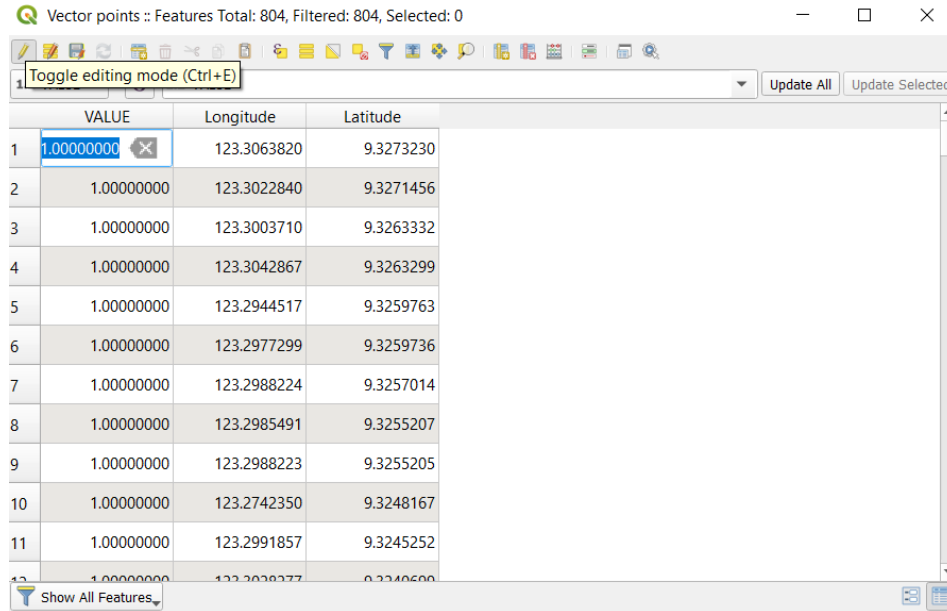
4.5. Repeat for the **Latitude** field. Fill out the **Field Calculator** as shown then click **OK**.

QGIS Screenshot 37: Adding the Latitude Field to the Vector Points

The screenshot shows the QGIS Field Calculator dialog. The 'Create a new field' checkbox is checked. Under this section, 'Create virtual field' is unchecked. The 'Output field name' is 'Latitude', 'Output field type' is 'Decimal number (real)', 'Output field length' is 12, and 'Precision' is 7. The 'Update existing field' checkbox is unchecked. The 'Expression' tab is selected, showing the expression: `y(transform($geometry, layer_property('output_b8b2d90b_ef86_48af_aea5_9e4c0e3f35c8','crs'),'EPSG:4326'))`. The 'Map Layers' list shows 'Vector points'. The 'Current value' is 'output_b8b2d90b_ef86_48af_aea5_9e4c0e3f35c8'. The 'Output preview' is 9.327322999093088. The 'OK' button is highlighted.

4.6. View the updated Vector points table and click the **Toggle editing mode**. Click **SAVE**.

QGIS Screenshot 38: Updated Vector points Attribute Table



Vector points :: Features Total: 804, Filtered: 804, Selected: 0

Toggle editing mode (Ctrl+E) Update All Update Selected

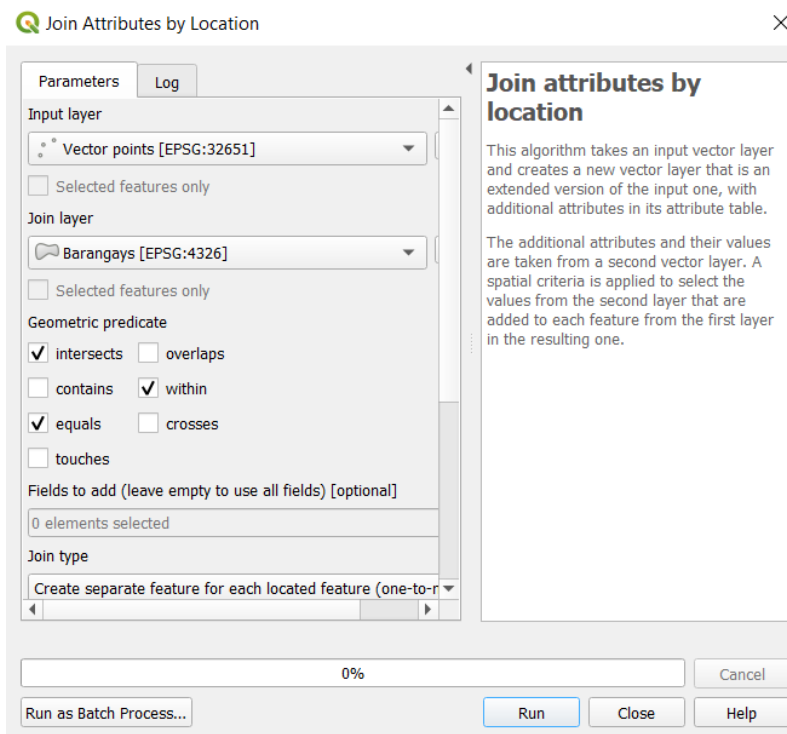
	VALUE	Longitude	Latitude
1	1.00000000	123.3063820	9.3273230
2	1.00000000	123.3022840	9.3271456
3	1.00000000	123.3003710	9.3263332
4	1.00000000	123.3042867	9.3263299
5	1.00000000	123.2944517	9.3259763
6	1.00000000	123.2977299	9.3259736
7	1.00000000	123.2988224	9.3257014
8	1.00000000	123.2985491	9.3255207
9	1.00000000	123.2988223	9.3255205
10	1.00000000	123.2742350	9.3248167
11	1.00000000	123.2991857	9.3245252

Show All Features

Expected Output: Vector Points with Longitude and Latitude Fields (GPS Coordinates)

4.7. Under **Processing > Toolbox**, click **Join attributes by location** and set as shown. Click **RUN**. This will generate the **Joined layer** (in the **Layer** window, right click on **Joined Layer > Open Attribute Table** – see below).

QGIS Screenshot 39: Join Attributes by Location



Join Attributes by Location

Parameters Log

Input layer
Vector points [EPSG:32651]

☐ Selected features only

Join layer
Barangays [EPSG:4326]

☐ Selected features only

Geometric predicate
☒ intersects ☐ overlaps
☐ contains ☒ within
☒ equals ☐ crosses
☐ touches

Fields to add (leave empty to use all fields) [optional]
0 elements selected

Join type
Create separate feature for each located feature (one-to-r

0%

Run as Batch Process... Run Close Help

Join attributes by location

This algorithm takes an input vector layer and creates a new vector layer that is an extended version of the input one, with additional attributes in its attribute table.

The additional attributes and their values are taken from a second vector layer. A spatial criteria is applied to select the values from the second layer that are added to each feature from the first layer in the resulting one.

QGIS Screenshot 40: Joined Layer Attribute Table

Joined layer :: Features Total: 804, Filtered: 804, Selected: 0

	VALUE	Longitude	Latitude	ID_0	ISO	NAME_0	ID_1	NAME_1	ID_2	NAME_2	ID_3	NAME_3	NAM	VARNAME_3	TYPE_3	ENGTYPE_3
1	1.00000000	123.3061800	9.3045303	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
2	1.00000000	123.3083654	9.3045284	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
3	1.00000000	123.3075458	9.3045291	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
4	1.00000000	123.3073633	9.3040770	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
5	1.00000000	123.3069081	9.3040774	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
6	1.00000000	123.3077276	9.3040767	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
7	1.00000000	123.3074544	9.3040769	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
8	1.00000000	123.3068172	9.3042584	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
9	1.00000000	123.3058155	9.3042592	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3	Poblacion No. 3	Barangay 3	Barangay	Village
10	1.00000000	123.3064528	9.3040778	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
11	1.00000000	123.3062707	9.3040779	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village
12	1.00000000	123.3058152	9.3038974	177	PHL	Philippines	52	Negros Oriental	1061	Dumaguete City	27833	Poblacion No. 3		Barangay 3	Barangay	Village

Show All Features

Expected Output: Joined Layer with GPS Coordinates and Barangay Fields

- 4.8. In the **Layer** window, right click on the generated **Joined layer**. Select **Export > Save Features As** and fill out as shown to save the Joined layer as CSV File. Click **OK**.

QGIS Screenshot 41: Saving/Exporting the Joined Layer as CSV File

Save Vector Layer as...

Format: Comma Separated Value [CSV]

File name: C:\Users\Raki\Dumaguete\Dumaguete-2020-Jan.csv

Layer name:

CRS: EPSG:32651 - WGS 84 / UTM zone 51N

Encoding: UTF-8

☐ Save only selected features

☒ Add saved file to map

▼ Select fields to export and their export options

Name	Type	Replace with displayed values
<input checked="" type="checkbox"/> VALUE	double	
<input checked="" type="checkbox"/> Longitude	double	
<input checked="" type="checkbox"/> Latitude	double	
<input checked="" type="checkbox"/> ID_0	integer	<input checked="" type="checkbox"/> Use Range
<input checked="" type="checkbox"/> ISO	string	

Select All Deselect All

☒ Replace all selected raw field values by displayed values

OK Cancel Help

- 4.9. The generated CSV file can be opened using Excel

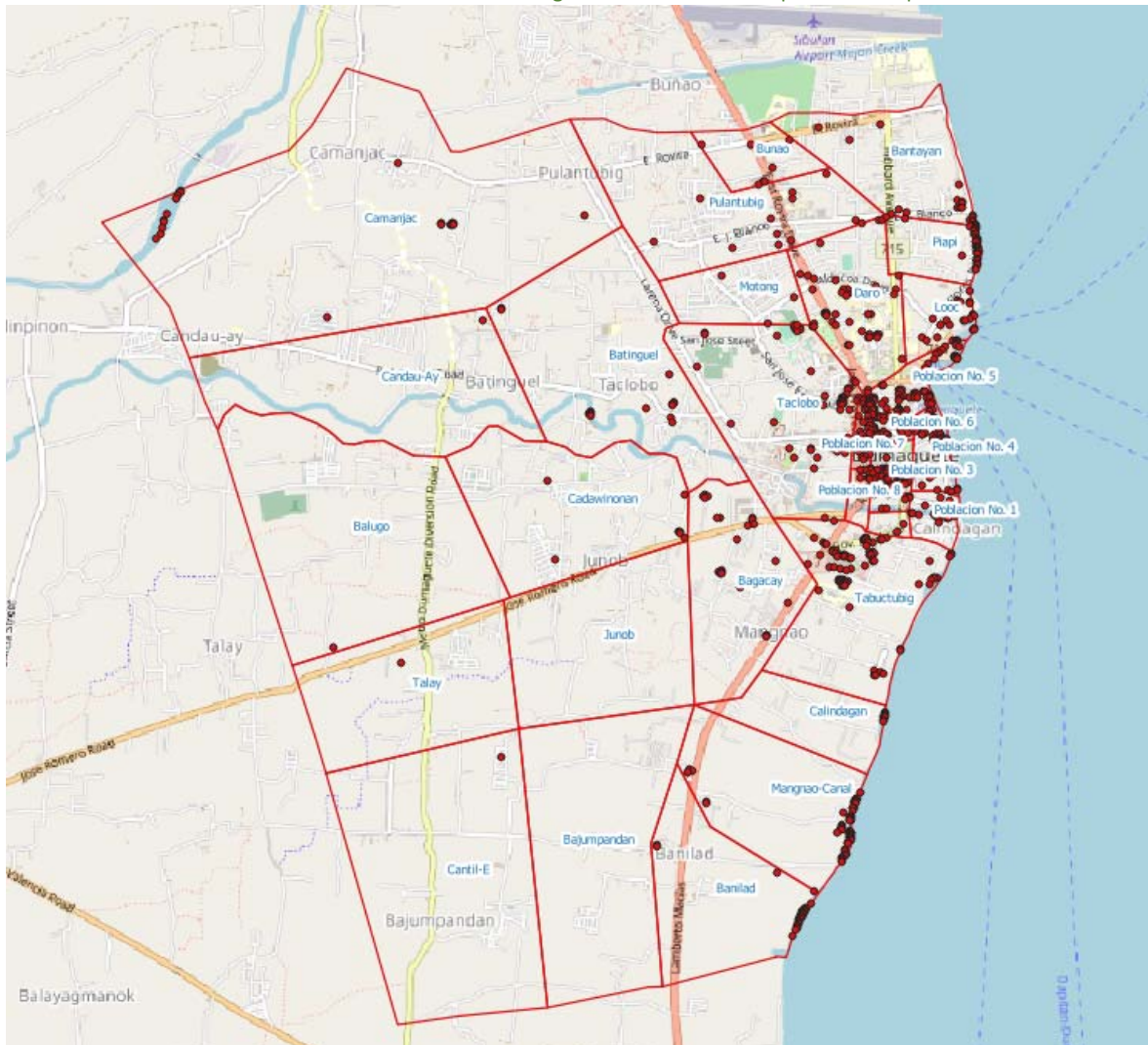
QGIS Screenshot 42: CSV File of Potential Dengue Hotspots (Stagnant Water Locations) in the City

Dumaguete-2020-Jan (Read Only) - Excel (Product Activation failed)																
File Home Customize Quick Access Toolbar Data Review View Tell me what you want to do...																
Paste Copy Format Painter Font Alignment Number Styles Cells Editing																
A1 VALUE																
VALUE	Longitude	Latitude	ID_0	ISO	NAME_0	ID_1	NAME_1	ID_2	NAME_2	ID_3	NAME_3	NL_NAME	VARNAME	TYPE_3	ENGTYPE	PROVINCE REGION
1	123.3006	9.313942	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
2	123.3018	9.313941	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
3	123.301	9.313851	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
4	123.3007	9.313761	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
5	123.301	9.31376	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
6	123.3008	9.31367	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
7	123.2947	9.313585	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
8	123.2947	9.313494	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
9	123.2994	9.3134	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
10	123.2942	9.31324	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
11	123.3017	9.313046	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	
12	123.3046	9.310411	177	PHL	Philippines	52	Negros Ori	1061	Dumaguete	27841	Tacloban		Barangay	Village	Negros Ori Central Visayas (Region VII)	



Expected Output: CSV File with Long, Lat and Barangay Fields

4.10. The CSV File output corresponds to the stagnant water locations (or potential Dengue hotspots) as shown below. These are the **red dots** when viewed using the **OpenStreetMap**.

QGIS Screenshot 43: Stagnant Water Points in OpenStreetMap



Common issues encountered:

- City requires more than 1 satellite image to cover the whole area (ex. Davao) – download all relevant images to cover the entire city then use Merge Layers; update bandset 1 with the merged B03, B04, B05 and B08 to use in computing FAPAR and NDWI
- Clicking FIND in SCP won't initiate the search for new satellite – make sure that product list is empty prior to clicking FIND by clicking on  button to delete/reset the list
- Clicking RUN in SCP won't initiate the download – make sure to preview the selected satellite before clicking RUN by clicking  to preview the image and add the JP2 layer to the project
- Stagnant water results to all zero values – decrease threshold values (0.xx in the formula) of FAPAR and NDWI for stagnant water computation (with the lowest possible threshold as 0.0 for both)
- Too many stagnant water locations detected - increase threshold values (0.xx in the formula) of FAPAR and NDWI for stagnant water computation
- StagnantWater.tif takes a very long time to generate and results to a big file (same size as NDWI and FAPAR) – make sure that NDWI_clipped and FAPAR_clipped are chosen in the expression; delete old StagnantWater.tif prior to re-computing

Revision History

- **Ver1.0: 01.31.2020** – Dumaguete used as sample city for Jan 30, 2020 satellite image (rdgarcia)
- **Ver2.0: 02.02.2020** – Added issue re: downloading due to multiple image previews; added common issues (rdgarcia)