

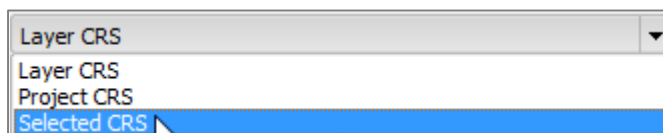
Exercise Supplement: Advanced Analysis

In this exercise you will learn how to identify points that fall within a certain distance of a feature. This exercise will use the example of determining which towns are located close to a permanent/perennial river or lake. You will learn to buffer a shapefile using a specified distance, merge polygon features, perform a spatial query, and create a new layer from a selection.

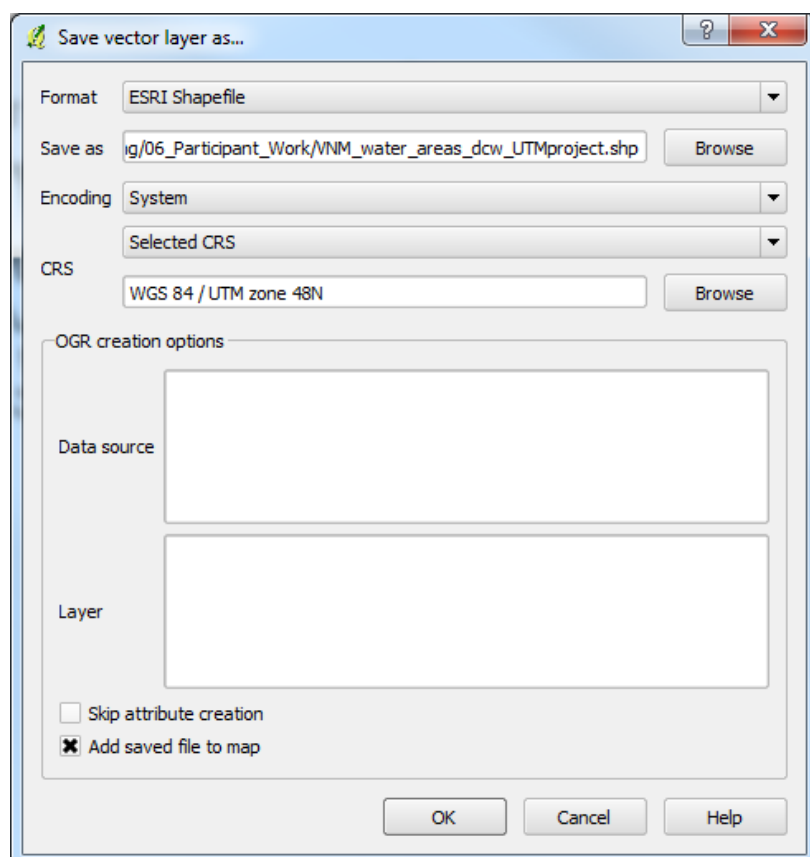
Section 1: Adding and re-projecting layers

The VNM_water shapfiles are in the WGS 84 coordinate reference system, for which the units are decimal degrees. In order to buffer the layers using a distance in meters, the layer must be re-projected into a projected coordinate system with meters for units.

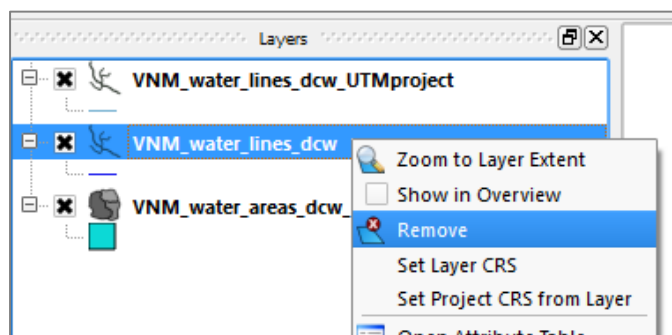
1. Open QGIS
2. Add the vector layer *VNM_water_areas_dcw.shp* from the data folder
\\Vietnam_Training\05_Data\03_Shapefiles\00_Country\Water
3. Right click on the layer and select *Save as...*
4. Select ERSI Shapefile for *Format*.
5. For *Save as*, browse to \\Vietnam_Training\06_Participant_Work\ and type
VNM_water_areas_dcw_UTMproject for the file name.
6. Select *Selected CRS* from the CRS drop down menu.



7. Click the *Browse* button to select the CRS.
8. Type 32648 into the *Filter* field of the *Coordinate Reference System Selector*.
9. Make sure the filter selected WGS 84 / UTM zone 48N.
10. Click OK.
11. Check the box next to *Add saved file to map*. Your window should now look the following example.



12. Click OK in the *Save vector layer as...* window.
13. Add the vector layer *VNM_water_lines_dcw.shp* from the data folder
 \\Vietnam_Training\05_Data\03_Shapefiles\00_Country\Water
14. Repeat steps 3-12 for the second layer, being sure to save it as *VNM_water_lines_dcw_UTMproject*
15. Make sure both new layers are turned on, and remove the original layers



16. Go to the *Settings* menu and select *Project Properties*.
17. Check the box next to *Enable 'on the fly' CRS transformation* and select WGS 84 / UTM zone 48N

☒ Enable 'on the fly' CRS transformation

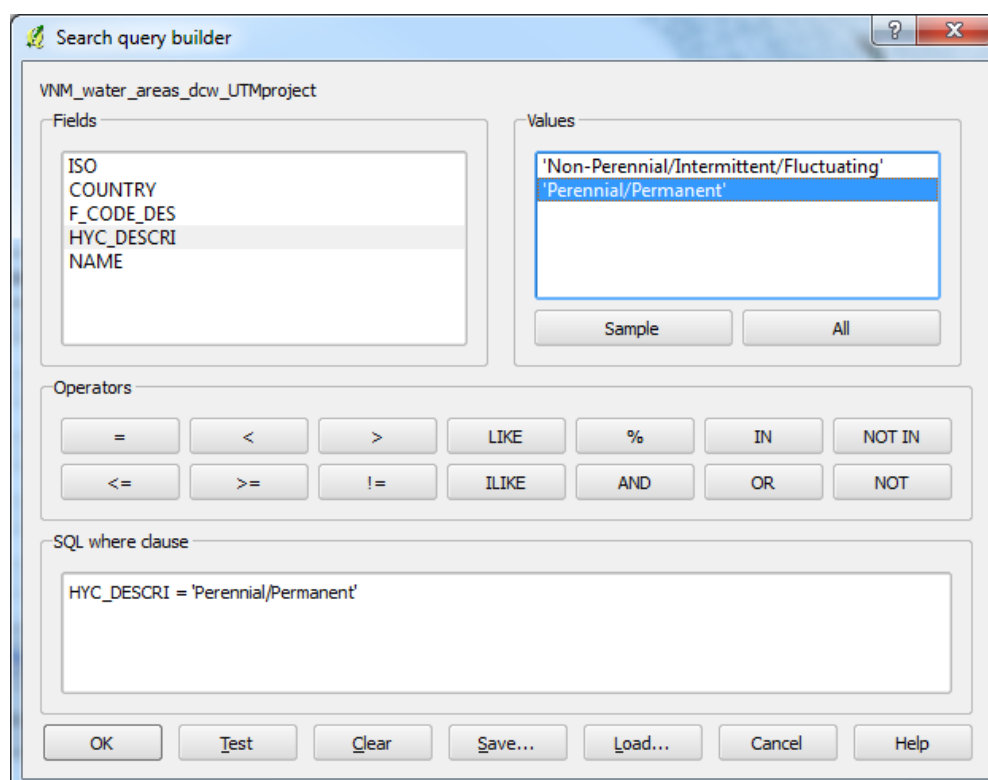


18. Click the *Zoom full* button.

Section 2: Creating a buffer

You only want to buffer Perennial or Permanent water sources, so you must select them from the layer.

1. Right click the *VNM_water_areas_dcw_UTMproject* layer and select *Open attribute table*.
2. Click the *Advanced search* button near the bottom right corner of the table.
3. In the *Search query builder* window, double click the *HYC_DESCR1* field so it appears in the *SQL where clause* box.
4. Click the equals sign in the *Operators* box.
5. In the *values* box, click the *All* button.
6. Double click the 'Perennial/Permanent' text within the *Values* box. Your *Search query builder* window should now look like the following example.



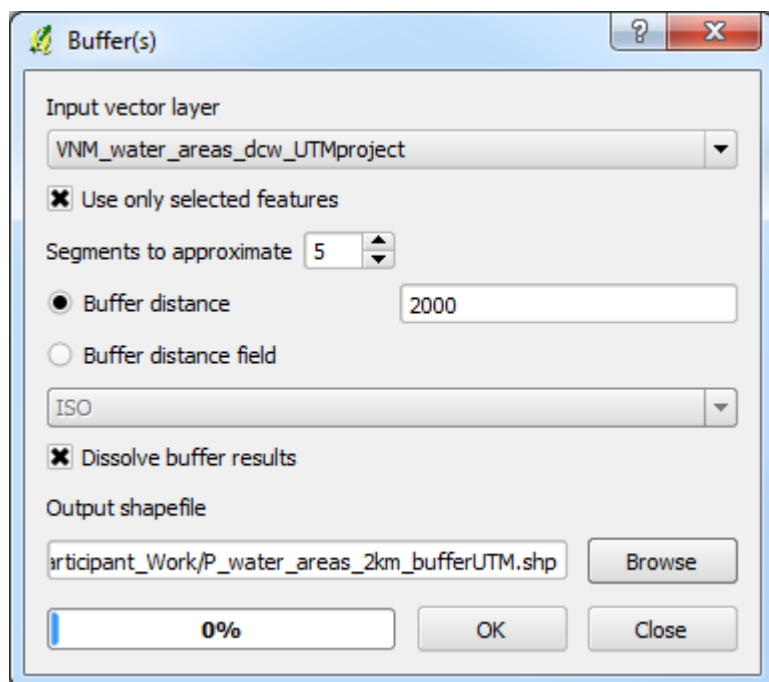
7. Click *OK*. All of the permanent river and lakes should now be highlighted.
8. In the *Vector* menu, select *Geoprocessing Tools > Buffer(s)*.
9. In the *Buffer(s)* window, choose *VNM_water_areas_dcw_UTMproject* for the *Input vector layer*.
10. Check the box for *Use only selected features*.

Note: Using only selected features will apply the buffer to only the Perennial/Permanent inland water, rather than the entire layer.

11. Select the radio button for *Buffer distance* and enter 2000 into the box. The units for the layer are in meters so this is equal to 2 kilometers.
12. Check the box for *Dissolve buffer results*.

Note: Dissolving buffer results will merge all the individual buffers of each river and lake into one single buffer.

13. Browse to \\Vietnam_Training\06_Participant_Work\ and name the file P_water_areas_2km_bufferUTM.
14. Your *Buffer(s)* window should look like the following example.



15. Click *OK*.

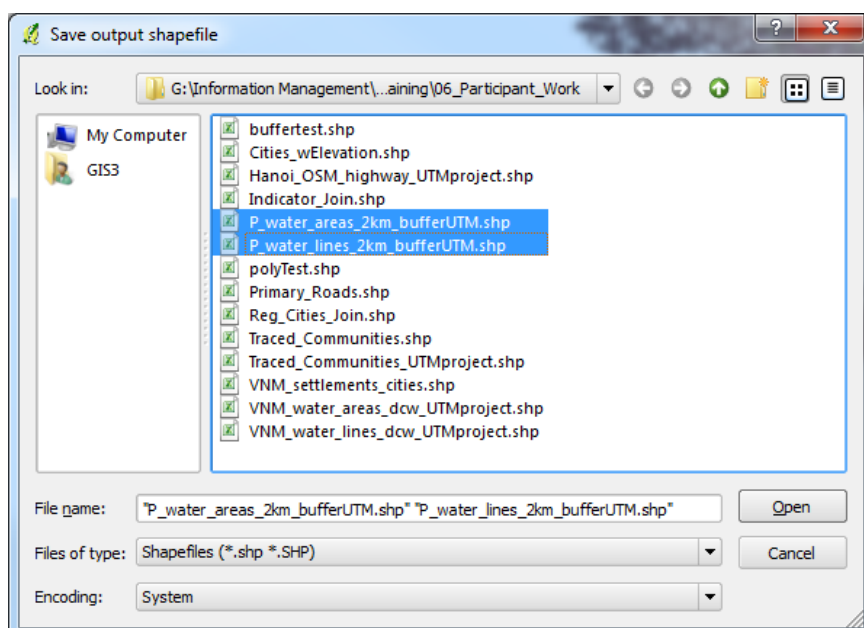
Note: The buffer tool may take several minutes to run. Do not click the *Cancel* button while the tool is running.

16. When the tool is done running, you will receive a prompt asking if you want to add the new layer to the TOC. Click *Yes*.
17. Close the *Buffer(s)* window.
18. Repeat section 2, steps 1-17 for the *VNM_water_lines_dcw_UTMproject* layer being sure to save your buffer layer as *P_water_lines_2km_bufferUTM*

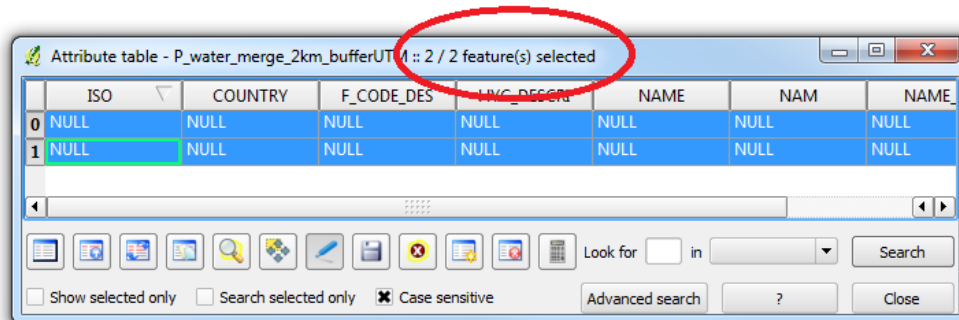
Section 3: Merging the Buffer layers

We want to combine the line and area layer buffers into one layer.

1. From the menu bar click *Vector > Data Management Tools > Merge shapefiles to one*.
2. Check the box for *Select by layers in the folder*.
3. Select *Browse* next to *Input files*.
4. Navigate to \\Vietnam_Training\06_Participant_Work\
5. Hold down the *Ctrl* key and select both your buffer shapefiles.



6. Click *Open*
7. Click *Browse* next to *Output shapefile*
8. Navigate to \\Vietnam_Training\06_Participant_Work\ and name your file *P_water_merge_2km_bufferUTM*
9. Check the box for *Add result to map canvas*
10. Click *OK*
11. You can remove all layers except *P_water_merge_2km_bufferUTM*
12. Right click the layer and click *Open attribute table* and select both polygon features

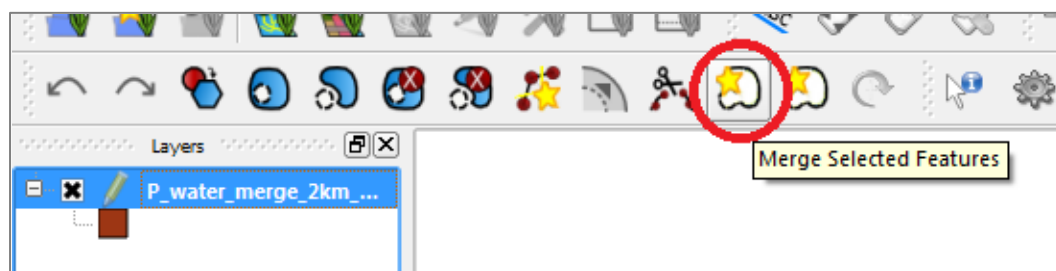


13. Close the attribute table



14. Click the *Toggle Editing* button
15. Select *Merge Selected Features* from the *Advanced Digitizing Toolbar*

Note: The icon for *Merge Attributes of Selected Features* looks the same.



16. Click *OK*

17. Toggle editing and save your changes

Note: Open the attribute table and check that the layer now contains only one feature.

Section 4: Adding and Re-projecting Layers

Now that the buffer is complete, we want to bring some other information into our map.

1. Add the *VNM_settlements_cities.shp* file from \\Vietnam_Training\06_Participant_Work\

Note: You created the file in Exercise 3.

2. Follow the steps from Section 1 of this exercise to save a shapefile version with name

VNM_settlements_cities_UTM.shp in \\Vietnam_Training\06_Participant_Work\ with a CRS of WGS 84 / UTM zone 48N

3. Add the *VNM_adm2.shp* file from \\Vietnam_Training\05_Data\03_Shapefiles\00_Country\Admin\

4. Follow the steps from Section 1 of this exercise to save a shapefile version with name *VNM_adm2_UTM.shp* with a CRS of WGS 84 / UTM zone 48N in \\Vietnam_Training\06_Participant_Work\

5. Make sure to add the new layers to your map and remove the originals

Section 5: Clip Your Data

1. Select the *VNM_adm2_UTM* layer in your TOC

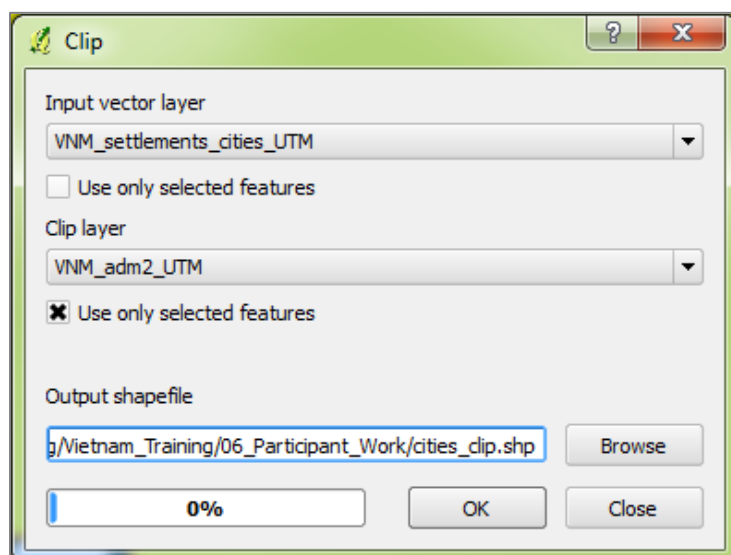
2. Use *Select a single feature* to select a single province

3. From the *Vector* menu click *Geoprocessing Tools > Clip*

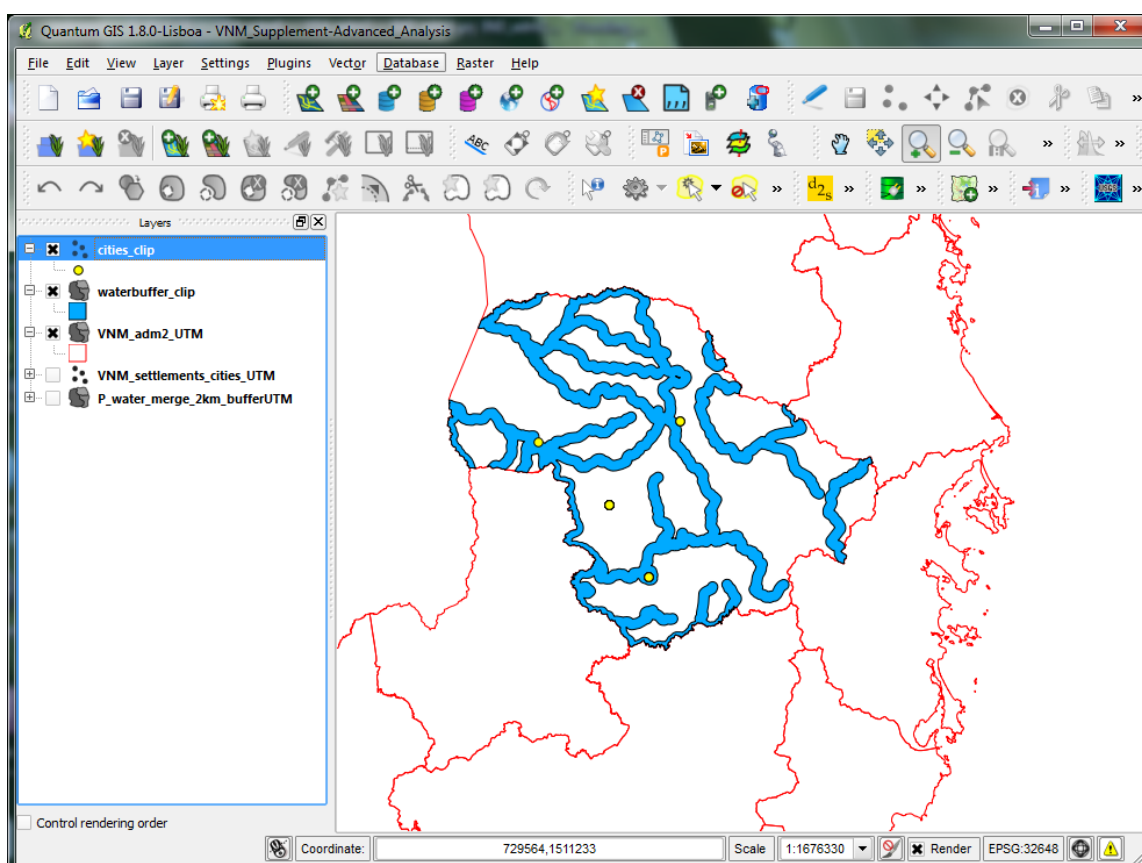
4. Set *Input vector layer* to *VNM_settlements_cities_UTM*

5. Set *Clip layer* to *VNM_adm2_UTM* and check *Use only selected features*

6. Save the Output shapefile to \\Vietnam_Training\06_Participant_Work\cities_clip.shp

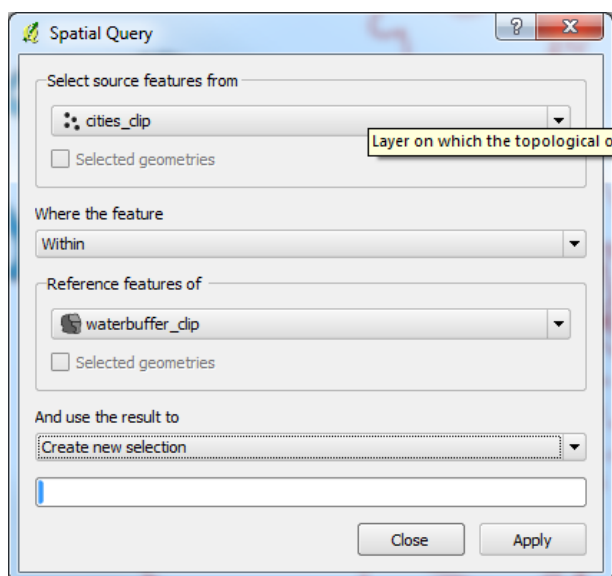


7. Click *OK* and then *Yes* to add the new layer to the TOC.
8. Set *Input vector layer* to *P_water_merge_2km_bufferUTM*
9. Set *Clip layer* to *VNM_adm2_UTM* and check *Use only selected features*.
10. Save the Output shapefile to \\Vietnam_Training \06_Participant_Work\waterBuffer_clip.shp
11. Click *OK* and then *Yes* to add the new layer to the TOC.
12. *Close* the Clip window.
13. You should now have a layer with City data and a layer with buffered water feature data, and both layers should include data for only a single province. Your map should look similar to the following example.



Section 6: Spatial Query

1. From the *Vector* menu click *Spatial Query* > *Spatial Query*
2. In the *Spatial Query* menu *Select source features from...* *cities_clip*, *Where the feature...* *Within*, *Reference features of...* *waterbuffer_clip*, *And use the result to...* *Create new selection*



3. Click *Apply* and then close
4. Right click the *cities_clip* layer in the TOC and click *Save selection as...*
5. Make sure the options are set to *ESRI shapefile* and *Layer CRS*
6. Check the *Add saved file to map* option
7. Save to `\\Vietnam_Training\06_Participant_Work\provinceCities_in_2km_waterBuffer.shp`
8. Click *OK*

The *provinceCities_in_2km_waterBuffer* layer should include only the towns that are within 2 kilometers of a perennial or permanent river or lake.

Why is this information important, and how could it be used?

End Exercise.

The information provided in this exercise is not official American Red Cross information and does not necessarily represent the views of the American Red Cross. The exercise was adapted from materials produced by MEASURE DHS and MEASURE Evaluation, which are funded by the U.S. Agency for International Development (USAID). The information from those materials is not official U.S. government information and does not necessarily represent the views of USAID or the U.S. government.