

LAB 1 – CREATING A LOCATOR MAP FOR BANGKOK, THAILAND

What you'll learn: Downloading data from various sources, loading and styling data in QGIS, and producing a basic locator map.

Data: Instructions to download data are included in the lab.

What you'll submit: In your thesis, you'll include this map (and any others you decide to make) using the in line with text option, as a PNG file, and using the caption "Map by author."

Background: In cases where you need a basic map for situating a geographic area, it can be easy and far more rewarding to make your own than find one from, I don't know, maps.org. This lab will teach you 1) basic principles of map design and 2) introductory techniques in QGIS for manipulating spatial data, using the example of a locator map in Bangkok, Thailand.

Lab naming conventions: Tools that you click will be bolded, e.g., **QGIS Menu > File > New** to create a new QGIS project file. Text that you'll type will have quotes around it, such as "MyNewProject.qgs" and names of existing datasets and directories will be italicized, e.g., *DataToUse.zip*. Key terms will be underlined. **Questions that you must answer for the lab or instructions for screenshots you must capture will be in bold green font. Important tips and key instructions will be in bold red font.**

STEP 1: DOWNLOADING YOUR DATA

Always begin by figuring out where you'll download your data. In the case of spatial data for Thailand, we have a few options.

<http://thaigis.net/thailand-gis-resources/>

http://www.bangkokgis.com/modules.php?m=download_shapefile

<https://data.humdata.org/dataset/thailand-administrative-boundaries>

Feel free to explore the data at these sources, but for the time being you should follow this link:

<http://www.diva-gis.org/gdata>.

Selecting "Thailand" as the country, you'll download three datasets from the "Subject" category: Administrative areas, Inland water, and Roads.

Download data by country

Select and download free geographic (GIS) data for any country in the world

Country

Thailand

Subject

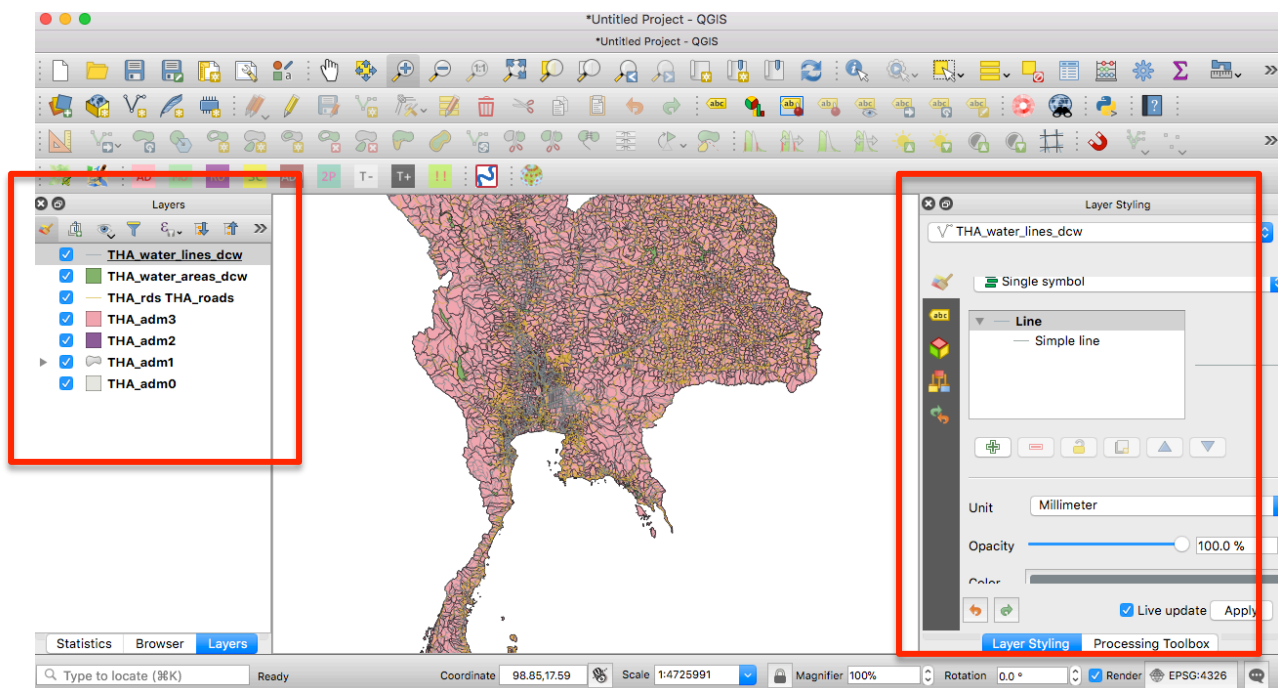
Roads

OK

Once you've downloaded the three datasets, unzip each one and load all datasets into QGIS. Note that the "THA_adm" file will include 4 different shapefiles.

TIP: It can be useful to set up a workspace, e.g., creating a folder called "Lab1" and a folder within that called "downloaded-data."

After loading the data into QGIS, your QGIS GUI (graphical user interface) should resemble the following screen:



On the right hand side, the **Layers Panel** should contain these 7 layers. On the right hand side, you should see the **Layer Styling Panel**, which is where you can adjust symbology. If you need access to either of these panels, they can be located under **View > Panels**.

On the bottom right-hand side of the screen you'll see a button that says "EPSG:4326." Click it to change the coordinate system and projection. Using the reference at this link, you can peruse and select an appropriate map projection:

<https://epsg.io/?q=Thailand%20kind%3APROJCRS>

EPSG:4326 is fine for the current project, so feel free to leave the projection as is.

In addition to getting data for Thailand, we also want to grab some data that situates the country; that is, we want data for other countries and water bodies. We can access this at Natural Earth:

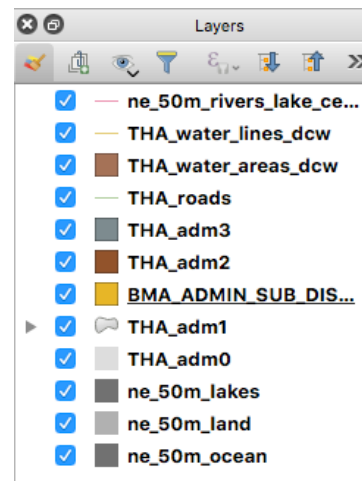
<https://www.naturalearthdata.com/downloads/>

This website makes available free vector and raster data, at various scales, for the entire world. The scale we want is "Medium," or 1:50m. Under "Medium," **click** "physical" and download 4 datasets:

- Land
- Ocean
- Rivers, Lake Centerlines
- Lakes + Reservoirs

Once you have this data downloaded, drag it to an appropriate location on your hard drive (e.g., the workspace you made), unzip it, and add it to the QGIS project.

You should now have 12 datasets loaded in QGIS. Arrange them in your **Layers Panel** to match the screenshot to the right; this will be helpful later on.



Now, before we move on to Step 2, would also be a good time to save your QGIS project if you haven't already!

STEP 2: STYLING A BASEMAP

So the data frame in QGIS probably looks pretty busy and insane right now. Go ahead and click off (e.g., uncheck) all the layers except for:

- ne_50m_ocean
- ne_50m_land
- ne_50m_lakes

We're going to style these layers to make a nice greyscale basemap, on top of which our map of Thailand will be drawn in the following step. Monochromatic greyscale

mapping is an art of its own. It follows the principles of **figure-ground**, a term that describes how mapmakers emphasize some features (the figure) while letting others fade to the back (the ground).

Morphocode has a great post about figure-ground that you can read here:

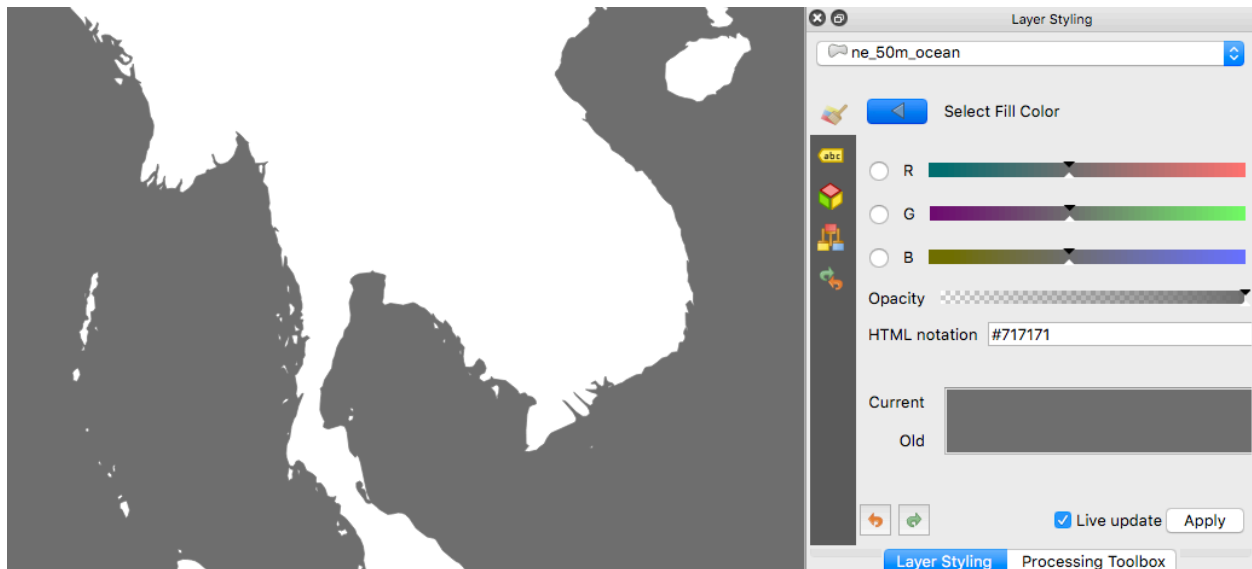
<https://morphocode.com/figure-ground-diagram/>

And you can check out an excellent example of a greyscale map of New York City (with JavaScript code examples) here: <https://snazzymaps.com/style/15/subtle-grayscale>



As you can see in the screenshot above, greyscale maps follow some general cartographic principles. Layers on the bottom should be the darkest (e.g., water), while layers on the top should pop out with increasingly lighter values (e.g., land, roads). The color palette will change depending on the demands of our map. Let's return to QGIS and start styling this basemap for Thailand.

First, click **Zoom to Layer** on one of the layers for Thailand, returning to the extent of our study area. Making sure your ocean layer is on the bottom, open the **Layer styling** panel and select **Fill > Simple fill**. Change both the fill color and the stroke color to HTML notation #717171 as shown below.



Next, change the fill and stroke colors for the “ne_50m_land” layer to #b1b1b1. Finally, change the fill and stroke colors for the “ne_50m_lakes” layer to #717171. The resulting data should resemble the image below:



Going forward, we’ll use the hexadecimal code #717171 for all water features in the map.

Make the Natural Earth river and lake centerlines layer visible, and change the color to #717171. Do the same with the layer “THA_water_areas,” changing both the stroke and fill colors to #717171. After doing so, you should be looking at a more detailed basemap that includes inland water features. The layer “THA_water_areas” is pretty detailed for

this scale, though, so you might consider making it invisible while we work on this section.

Now that the basemap has been effectively styled (we’ll add labels later), we can move on to drawing Thailand itself.

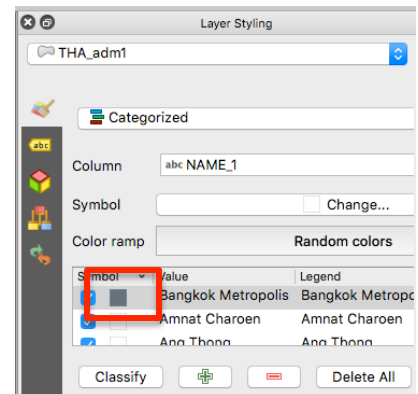
STEP 3: STYLING THAILAND AND BANGKOK

As mentioned in the previous step, the features for Thailand should pop out against this darker basemap. Let’s begin by clicking on the layer “THA_adm0”. This layer contains a single record for the extent of the country of Thailand. Change the fill and stroke colors to #ddddd. Next, in the **Layer Styling** panel for “THA_adm1”, represent the features

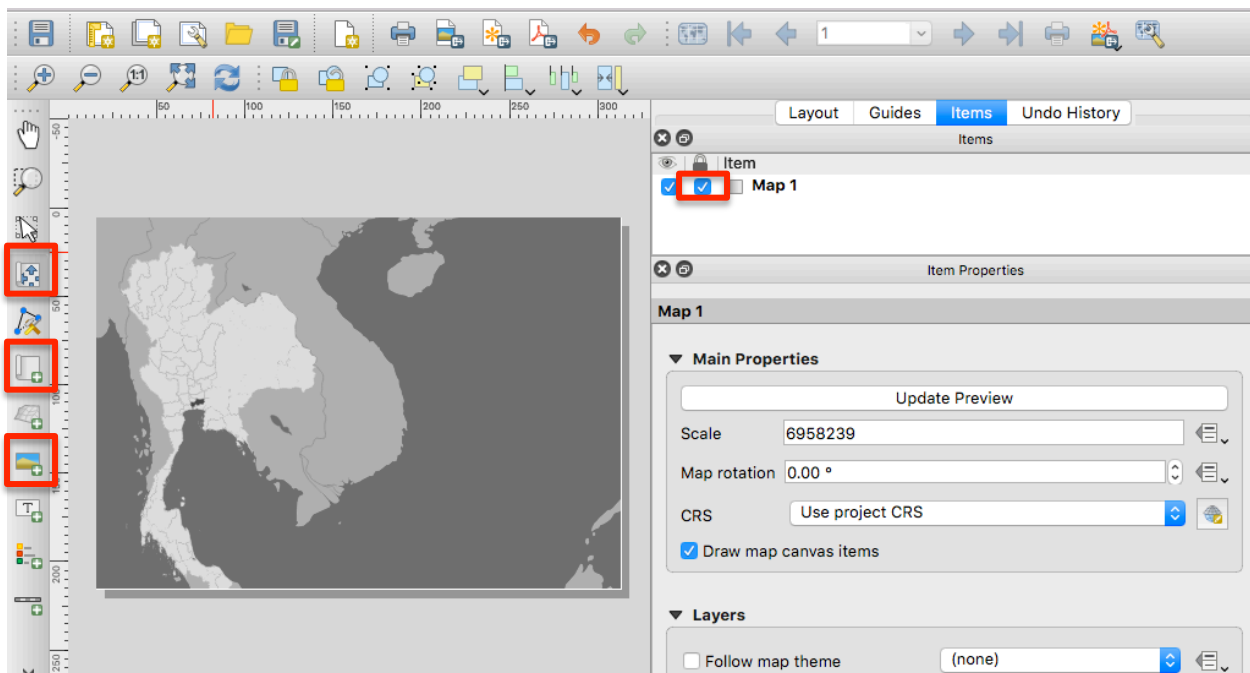
as “Categorized” by the column “NAME_1”. Click **Classify**, and you should see all of Thailand’s municipal boundaries pop up in vivid color. We want to change this.

First, **click** on the button that says “Change...” symbol. Set the fill to full opacity and the stroke to #6d6d6d. After you’ve done this, return to the main window for **Layer styling** and **double-click** on the symbol box for “Bangkok Metropolis”, as shown to the right.

Set the fill and stroke colors to #484848. This will create an effect where the general municipalities in Thailand are highlighted with a subtle grey, while the city of Bangkok pops out with a very dark grey.

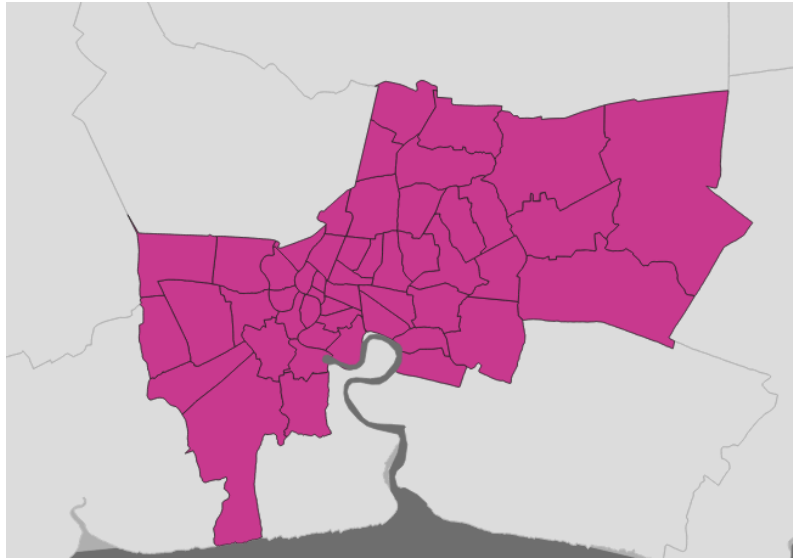


At this point, we can open the **Print Composer** and add this to a draft of a map. From the main tab, select **Project > New print layout**, and title it “Bangkok Locator Map”. Using the buttons highlighted in red boxes below, **Draw** the map and **Move the item content** such that the image resembles this screenshot. **Select Layout > Export as Image, and save as “thailand_locator”**. Then, delete this image from the composer and, using the **Add image** button, add the PNG you just saved.

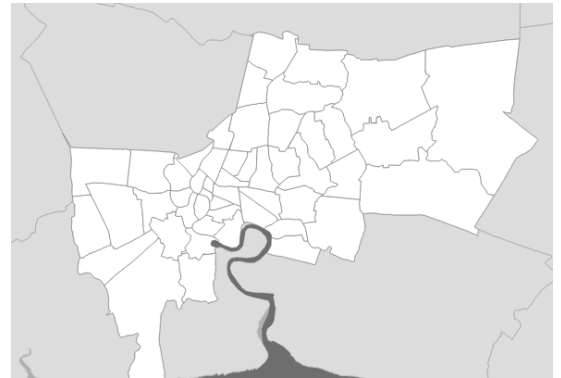


Now, return to the main project’s data frame. Here we’ll be zooming into Bangkok to style the metropolitan area. Use the **Magnifying glass tool** to zoom to the extent of Bangkok.

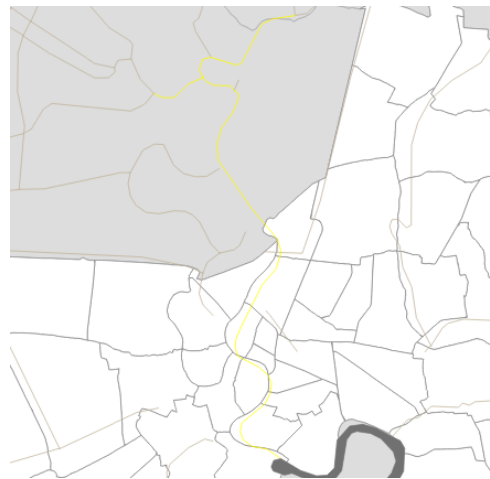
First, in the **Layer styling panel**, categorize “THA_adm2” by the column “NAME_1”. Remove all classes except for “Bangkok Metropolis” – you should see something resembling the screenshot below:



Change the fill color to #ffffff and the stroke color to #8b8b8b, updating the symbology as such:

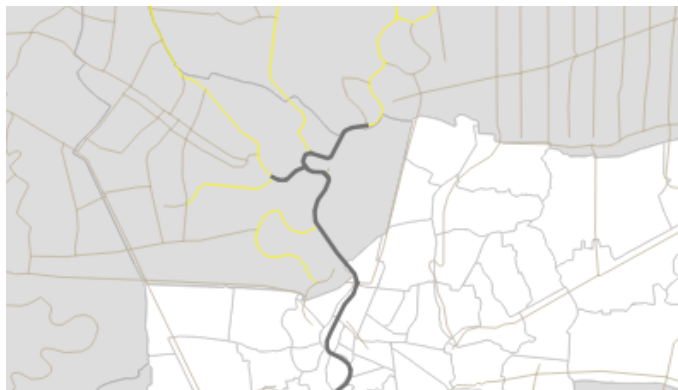


Make the “THA_water_lines_dcw” layer visible. This is an extremely busy layer and we want to isolate a couple of key features in the Chao Phraya River, removing others. To do so, let’s zoom in on the Chao Phraya River. Using the **Select features by area** tool, click on the water features that are highlighted in yellow.



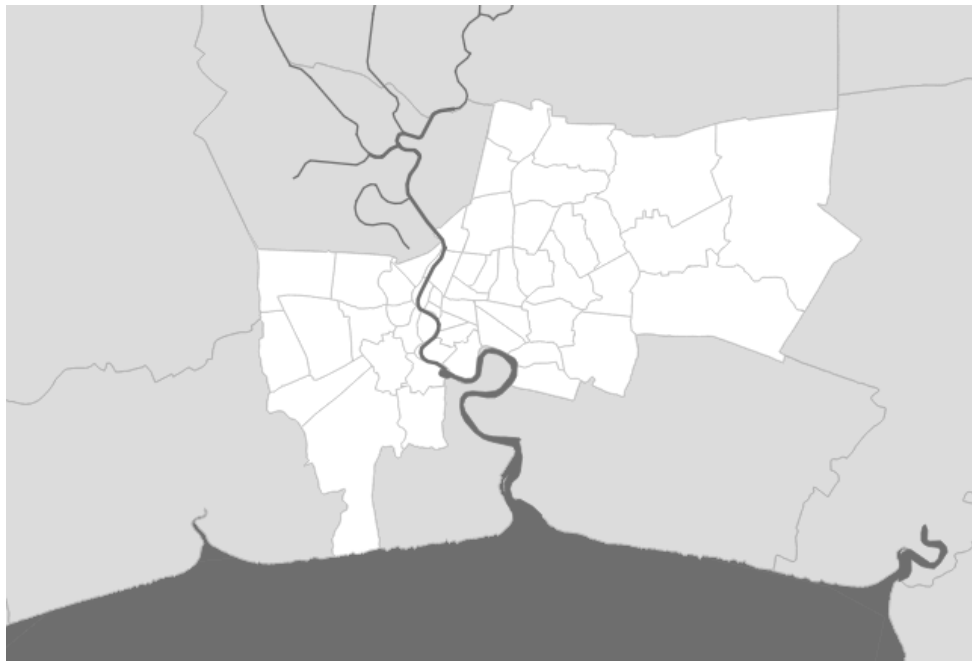
Next, **Right+click** the “THA_water_lines_dcw” layer and select **Export > Save selected features as...** Save the features as a GeoJSON, naming the output “chao_phraya”. When you’re done, add the new layer to the project. Set the stroke color to #717171 and the stroke width to 0.86.

Next, using the **Select features by area** tool again, you’ll select tributaries from the main river by clicking on features around it. Click on the lines highlighted in yellow in the screenshot to the right. Save it using the same technique and name the output “water_diss_small”. After adding it to the project, set the stroke color to #717171 and the width to 0.46.

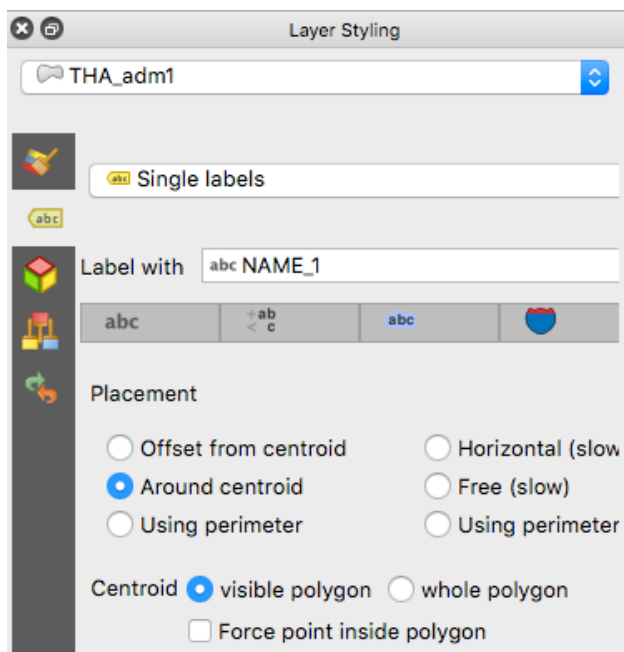


Now, you should have two new water layers, styled to match the oceans and lakes in

color. Make sure the “THA_water_lines_dcw” layer is invisible. Also, change the stroke and fill color in the land layer to #717171 (this will get rid of a few grey spots that stick out undesirably at this scale). At this point the data frame should resemble the following:



Before entering the **Print composer**, we can add some labels. In the “THA_adm1” layer. Click the **Labels** button in the **Layer styling panel** and match the screenshot below:



This should successfully label the various municipalities. Be sure to adjust the font, halo, and size to your liking. I recommend the following combination:

- Font: Avenir, Light, size 14
- Wrap on a space (click the space bar once in the “Wrap on character” input)
- Use a 1pt size text buffer, color white

The rivers will be a little trickier to label nicely, and we’ll need to run some basic geoprocessing to fix these layers. First, in the main menu, navigate **Vector > Data management tools > Merge vector layers**. Your input layers should be the two water features we’ve isolated: namely,

chao_phraya and *water_diss_small*. Click **Run** to generate a temporary layer and inspect the attribute table of the output.

Once you're in the attribute table, you can begin making some changes to the layer that will make labeling and symbology much easier. We're going to open the **editing mode** by clicking the pencil. **Make sure that you don't have any layers currently selected.** Then, we'll create two new fields using the **New field button**. Create two fields with the following parameters:

- First field
 - Name: "river_name"
 - Type: Text
 - Length: 30
- Second field
 - Name: "type"
 - Type: Whole number (integer)
 - Length: 1

Using your preferred method, update the "river_name" field for all records – there should be about 24 records – with the value 'Chao Phraya River'. Then, update the "type" field accordingly:

- Where all records in which the "layer" field equals "chao_phraya", "type" equals 1
- Where all records in which the "layer" field equals "water_diss_small", "type" equals 2

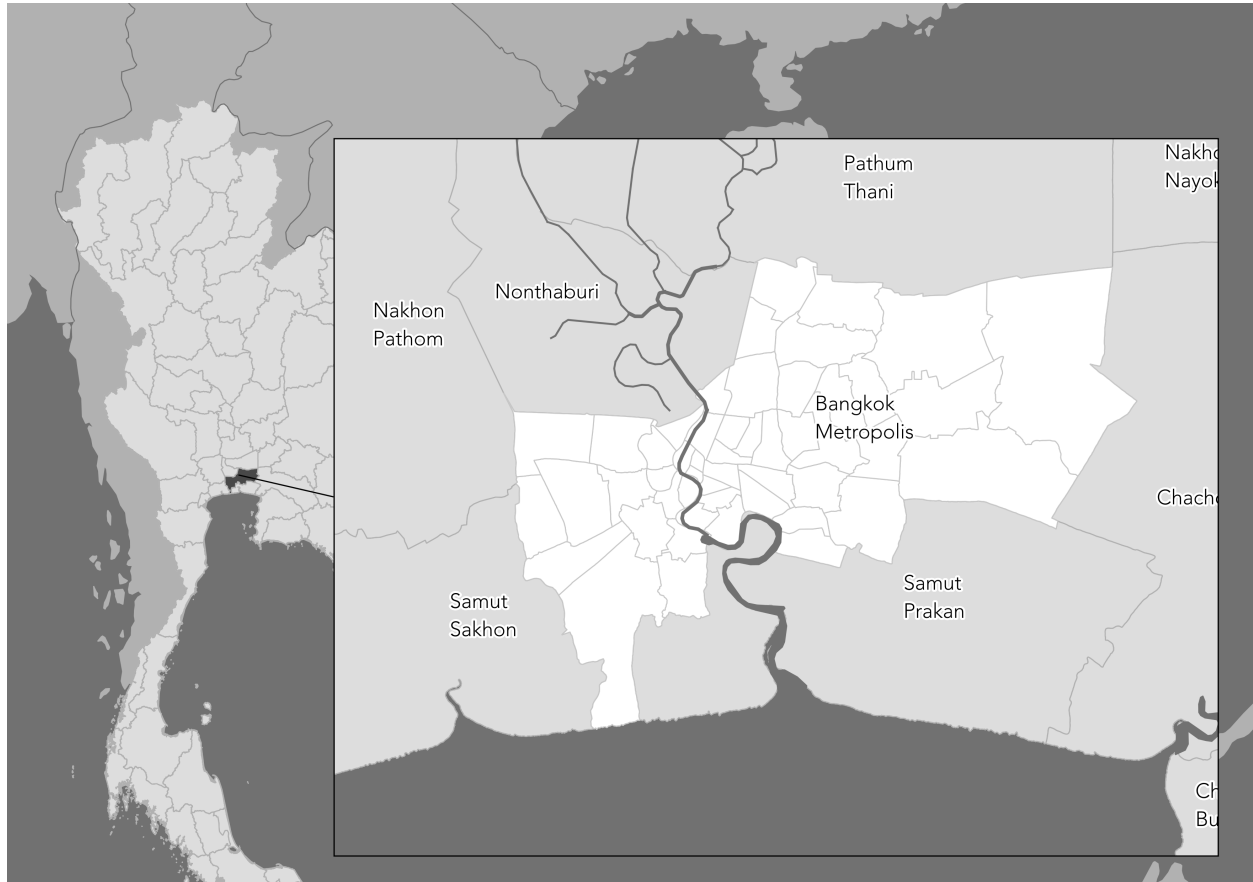
Once you've performed these changes and saved them in your editing session, you will run a final geoprocessing tool. Navigate to **Vector > Geoprocessing tools > Dissolve**. The input should be your temporary layer "Merged". The Dissolve field should be set to "type". Once these parameters have been set, click **Run**.

Confirm that in the output's attribute table there are only two records: one record for the main river, and one record for its tributaries. If that's correct, go ahead and **right+click** the "Dissolved" layer and **Export > Save features as...** Save the output as "chao_phraya_river", add it to the map, and uncheck or remove your old water features.

You should symbolize the layer Categorized by "type." Then, for the 1 class, set the stroke color to our universal water color, #717171, and the width to 0.86. For the 2 class, set the color to #717171 and the stroke to 0.46.

Finally, label the *chao_phraya_river* layer using the field "river_name". I recommend the following combinations for font: Georgia (or any serif font), italicized, 10-11pt. Test out using the "curved" placement option, but note this can be challenging to perfect. It is okay to leave the river name out.

Return to the print composer and draw a new map, zoomed to the extent of the city of Bangkok, in the space that takes up roughly the right-hand two-thirds of the map canvas. Add a line that connects that map to the Bangkok metropolitan area on the larger Thailand basemap. The result should resemble the following:



Export this map as a PNG and enjoy! And don't forget to write, "Map by author" in the caption.