QGIS quick guide

These instructions have been composed especially with those students in mind who have not used any GIS software previously.

1. Working with QGIS

These instructions are written using QGIS 3.10 (also tested with 3.22.7). You can freely download QGIS at: https://qgis.org/en/site/forusers/download.html.

You can also access QGIS via remote access to classroom computers (vdi.aalto.fi). To see which computer classes have QGIS installed, you can check https://computers.aalto.fi/.

Information on the user interface of the program can be found here: https://docs.qgis.org/3.10/en/docs/user_manual/introduction/qgis_gui.html. The GUI (graphical user interface) is pictured in Figure 1. You can select which panels are showing from View (in the Menu) – Panels.

- **Layers are used to display spatial datasets in the map view.** A layer references a dataset and specifies how it is portrayed (symbols, colors).
- In the GUI, layers can be used to process spatial data with **geoprocessing tools/functions/algorithms**.

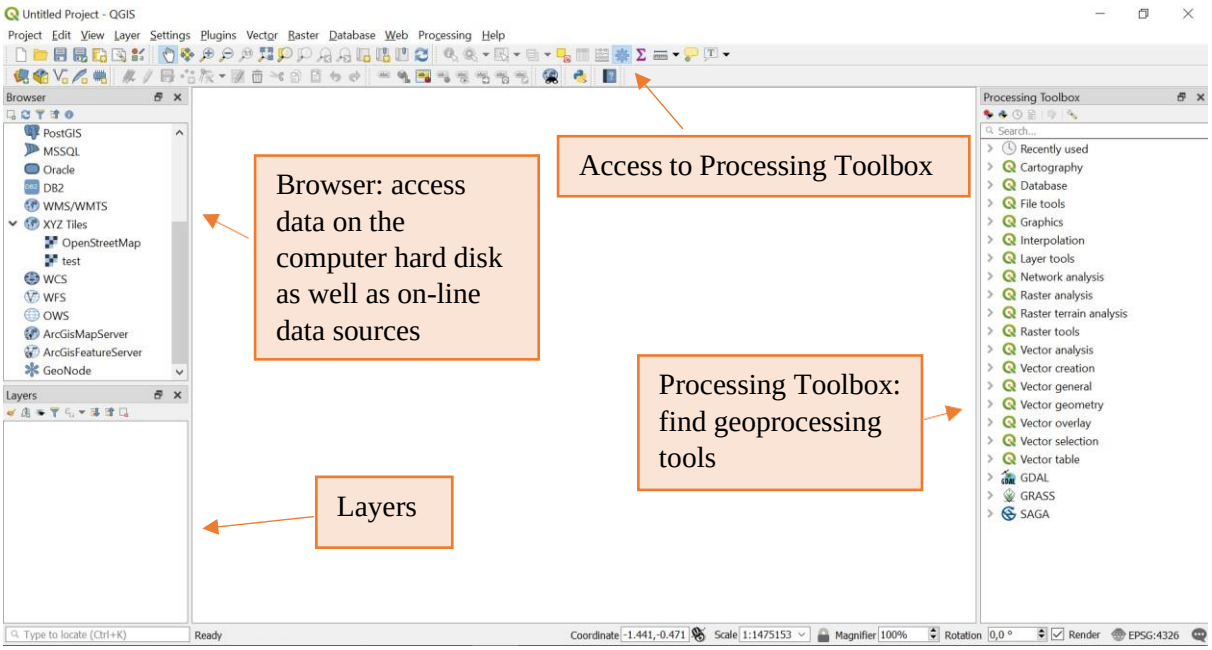
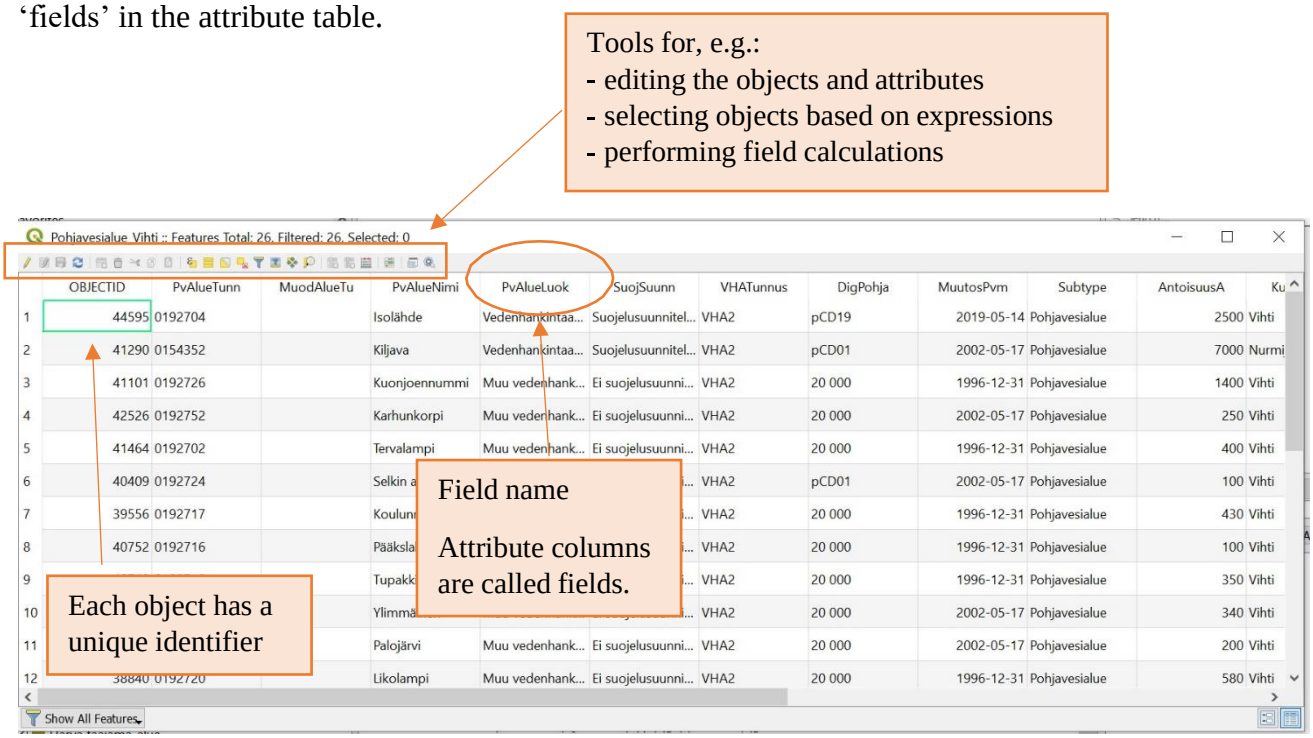


Figure 1. The QGIS main user interface.

2. Vector layers

Vector data (point, lines, polygons) are discrete features. They have attributes related to each object that are listed in the attribute table. You can access the attribute table by right clicking on the layer and selecting Open Attribute Table. An object can consist of one part (one point, one polygon etc.) or multiple parts (several points, several polygons etc.). Each object can have only one value (numerical or text, in most cases) per each attribute. Attributes are shown in 'fields' in the attribute table.



	OBJECTID	PvAlueTunn	MuodAlueTu	PvAlueNimi	PvAlueLuok	SuojSuunn	VHATunnus	DigPohja	MuutosPvm	Subtype	AntoisuusA	Ku
1	44595	0192704		Isolähde	Vedenhankintaa...	Suojelusuunnitel...	VHA2	pCD19	2019-05-14	Pohjavesialue	2500	Vihti
2	41290	0154352		Kiljava	Vedenhankintaa...	Suojelusuunnitel...	VHA2	pCD01	2002-05-17	Pohjavesialue	7000	Nurmi
3	41101	0192726		Kuonjoennummi	Muu vedenhank...	Ei suojelusuunni...	VHA2	20 000	1996-12-31	Pohjavesialue	1400	Vihti
4	42526	0192752		Karhunkorpi	Muu vedenhank...	Ei suojelusuunni...	VHA2	20 000	2002-05-17	Pohjavesialue	250	Vihti
5	41464	0192702		Tervalampi	Muu vedenhank...	Ei suojelusuunni...	VHA2	20 000	1996-12-31	Pohjavesialue	400	Vihti
6	40409	0192724		Selkin a			VHA2	pCD01	2002-05-17	Pohjavesialue	100	Vihti
7	39556	0192717		Koulun			VHA2	20 000	1996-12-31	Pohjavesialue	430	Vihti
8	40752	0192716		Pääksla			VHA2	20 000	1996-12-31	Pohjavesialue	100	Vihti
9				Tupakk			VHA2	20 000	1996-12-31	Pohjavesialue	350	Vihti
10				Ylimmä			VHA2	20 000	2002-05-17	Pohjavesialue	340	Vihti
11				Palojärvi	Muu vedenhank...	Ei suojelusuunni...	VHA2	20 000	2002-05-17	Pohjavesialue	200	Vihti
12	38840	0192720		Likolampi	Muu vedenhank...	Ei suojelusuunni...	VHA2	20 000	1996-12-31	Pohjavesialue	580	Vihti

Figure 2. An example of an attribute table of a vector layer.

QGIS manual on vectors:
https://docs.qgis.org/3.10/en/docs/user_manual/working_with_vector/index.html

3. Raster layers

Raster layers have values in grid cells (pixels), which cover an area forming a regular tessellation. Most often one grid cell has one value. Typically, the cells are squares, but they can also be triangles or hexagons.

There is no raster attribute table in QGIS (ArcMap has it, where each value and the number of cells with that value are shown).

QGIS manual on rasters:
https://docs.qgis.org/3.10/en/docs/user_manual/working_with_raster/index.html

4. Adding a basemap

In the browser select "XYZ tiles" and from there OpenStreetMap to get a background map.

5. Saving your work

In QGIS, you can

- save the workspace (.qgz/.qgs), which will save your layout of the layers and connections to datasets through interfaces in QGIS (but not data sets that you have created). The workspace is saved by selecting Project – Save/Save As.
- save your spatial data sets
    - Layer (in menu) – Save As
    - In Layers panel, right click layer and select Export – Save As

Note that, geoprocessing tools/functions will not automatically save the results as a file, instead they will create a temporary layer, which will be deleted once you exit QGIS. If you want to save the output as a file, press the three dots and select Save to File (Figure 3, the 'Clip' geoprocessing tool window).

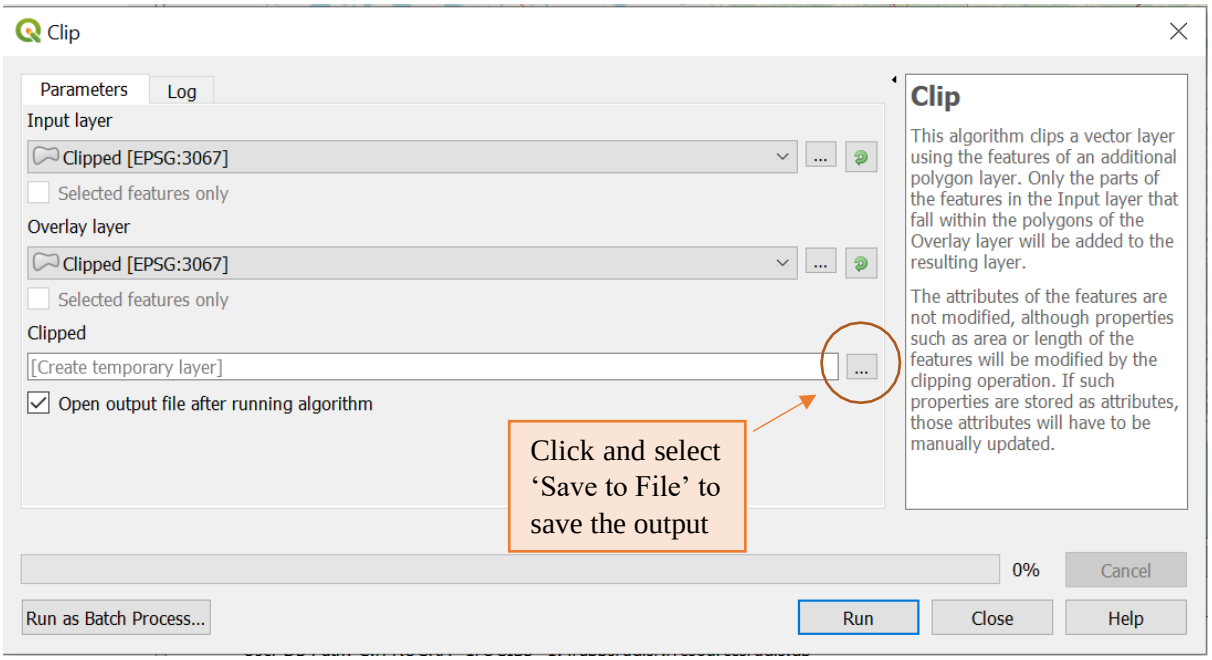


Figure 3. An example of saving the output from the Clip tool.

6. Coordinate systems

The coordinate reference system (CRS) in QGIS is transformed automatically "on the fly". This means that regardless of the underlying CRS of particular map layers in your project, they will always be automatically transformed into the common CRS defined for your project. This might not apply to all available tools/algorithm, however. Hence, if there is a problem try transforming the data you are using to a common CRS.

The spatial reference system of each dataset can be found through the URLs, for example see figure 4. In figure 4, the coordinate/spatial reference system is given as an EPSG[1] code (3067 in this case, which corresponds to ETRS89 / TM35FIN(E,N)). The EPSG is a widely used registry of spatial reference systems.

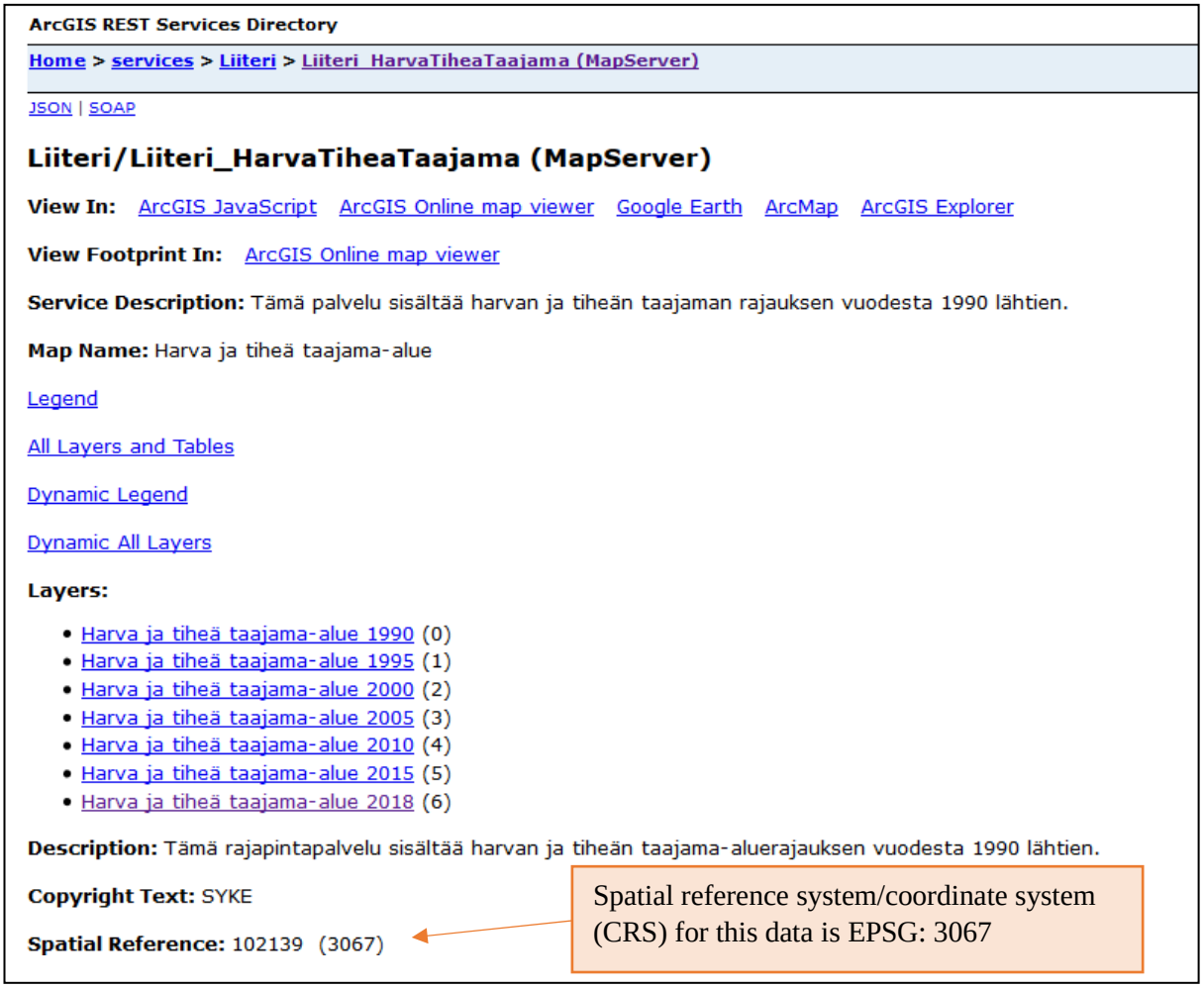


Figure 4. Example of SYKEs data in ArcGIS MapServer directory.

7. Some solutions to possible issues

If you encounter an error/problem, sometimes it helps if you close and reopen QGIS (remember to save your work/files first). Also, typing the error message into Google or browsing the QGIS user guide usuallyhelps to see what might have happened.

Algorithm/tool is taking too long

Try an alternative method or save/clip the data to the area of interest.

Program becomes frequently unresponsive

Some datasets can be really large so it may help to toggle off the Render-selection in lower right corner or turn off large layers that you dont need. Disabling rendering causes your view to freeze and not be updated if you move or zoom in your view. Remember to turn render on once you want to refresh your view.