



Installing QGIS

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Purpose of this lecture

- To install QGIS program
- To make yourself familiar with QGIS tools/interface

Topics

- Installing a QGIS
- What are the main GIS data types
- How to use QGIS interface/main tools
- Importing data layers to QGIS project
- How to save QGIS project

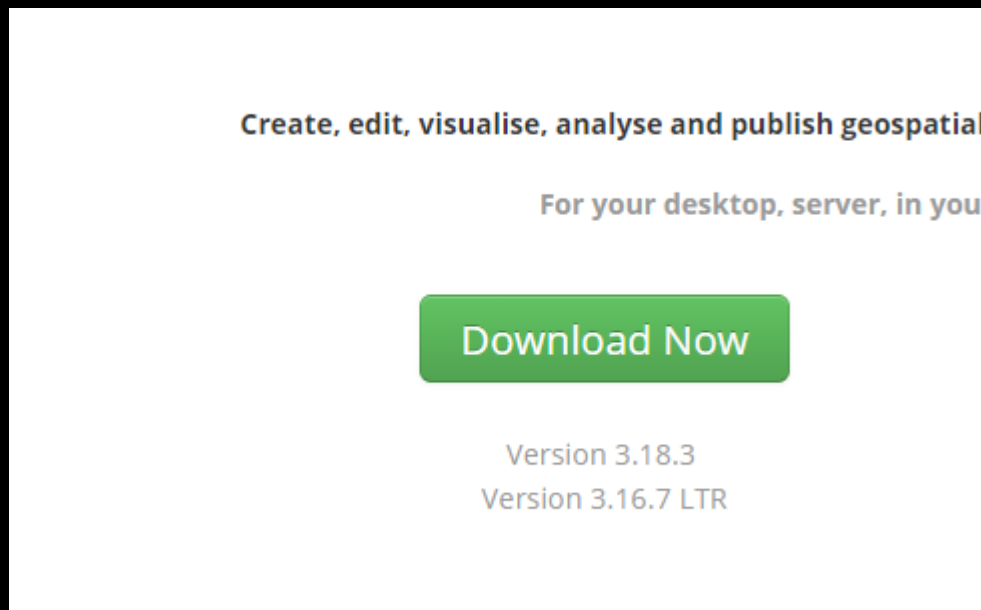
QGIS

- Open source and free to download software
 - Free Access to full version with all tools
- One of the many GIS applications
 - There are more out there (ESRI)
- Good documentations
 - Beginner friendly



Installing a QGIS to your computer

- <https://www.qgis.org/en/site/>



Two main types of data in GIS

- Raster
 - More like a grid with cells
- Vector
 - More like objects of points and lines
- First theory and afterward practises

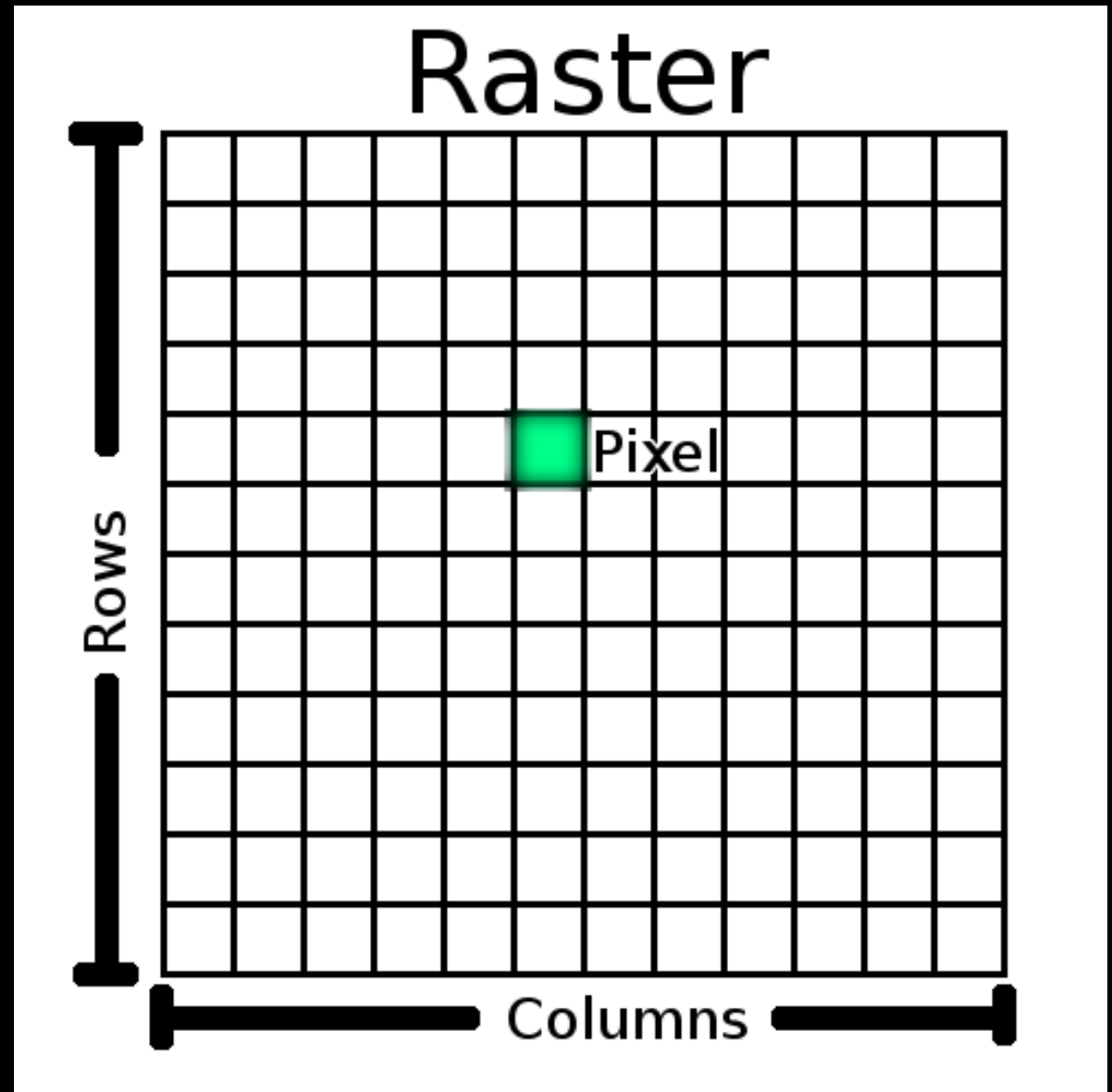
How data is hold in QGIS

- We see that information has to be arranged somehow to understand it.
- You can't explode all Excel cells like an unsolved puzzle and then understand what is in there.
- There has to be some kind of way to arrange data so that it has a common structure- we call it data type.
- In Excel it is mostly by tables and graphs but those are also made based on tables.

Raster data

- **Data type- how the data is saved and rendered in QGIS**
- Raster is like every picture
- Raster is like PC monitor
- Raster is like TV

- Raster has cells- pixels
- We call them **cells**, in photography they call it **pixel**



Raster data

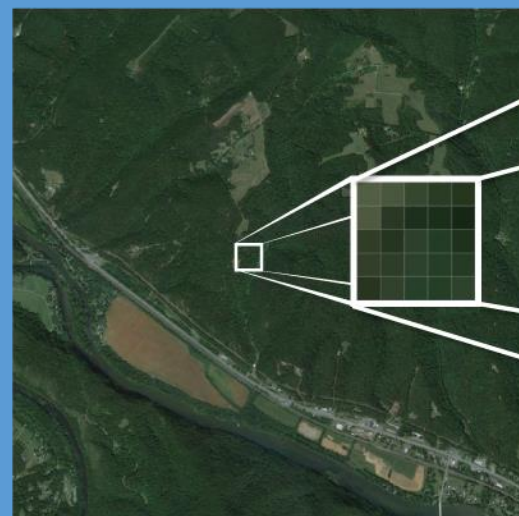
- Best to represent a variable changing data
- Like height, raindrops, populatsion
- Data is organised into columns and rows. Every cell has it's own value

- Ex: orthophoto?
 - Is this raster or not and why?

Raster

- Raster is a grid containing cells and every cell has values
- Here is photo formed as a grid
- Every cell has a value



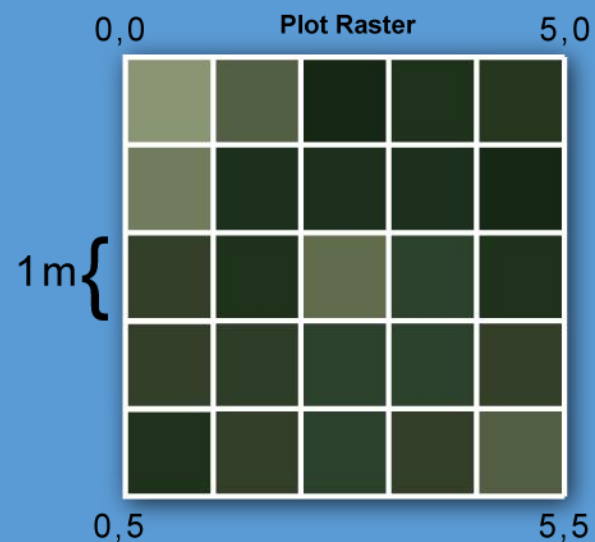


0,0 5,0

1	3	9	7	7
2	8	7	7	8
6	7	3	5	7
7	6	5	5	6
8	6	5	6	4

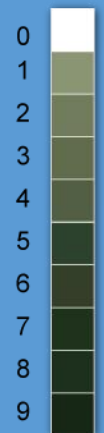
1m {

0,5 5,5



Every cell has a value representing something (elevation, raindrops etc)

Legend



Cell values- how we get them?

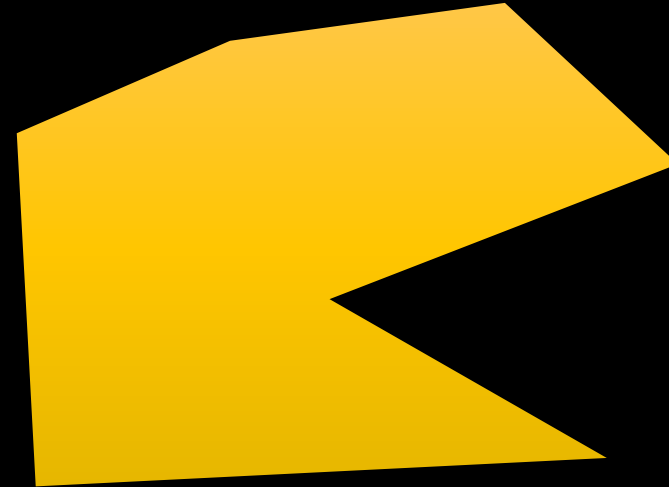
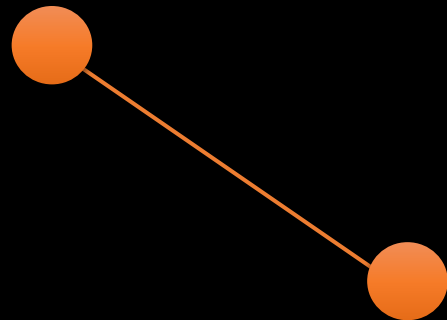
- You want to cover an area of heights.
- So you make 1m x 1m cells over the area.
- Now you measure height almost in the center of the cell and plot those to map.
- Now we have a grid with values inside every cell.
- And we could represent every cell with a different color depending on the height.

About vector data in GIS

- Vector is a way to render the objects in GIS
- Every object has a **position** and **attributes** that give **extra information about an object**

Forming vector objects

- We have three main types of **vector data** in GIS
 - **Point** (simplest)
 - **Line**- many points are connected
 - **Polygon**- origin and destination points are the same



Raster and vector- comparison

Raster:

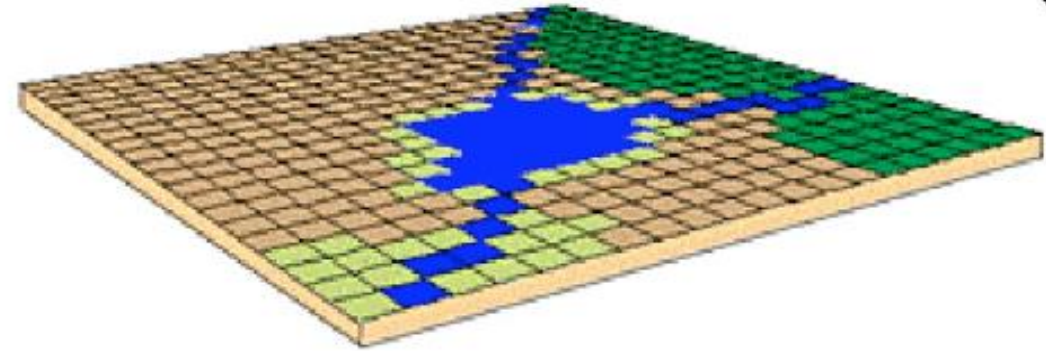
Images,
Consist of grid and cells
(pixels),
Good to represent continuous
data.

Vector:

Has many attributes their
values located in attribute
table,
Good for discrete data,
Houses, streets, lakes.

Differents in types

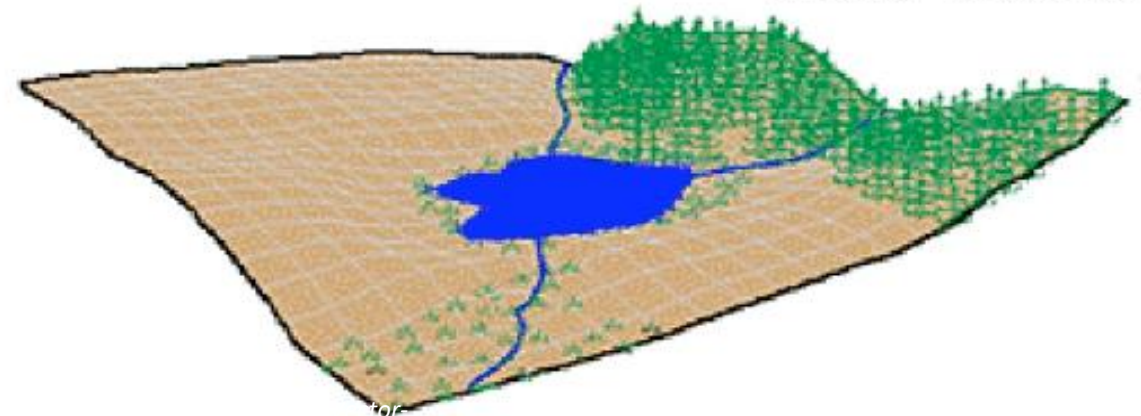
Raster / Image



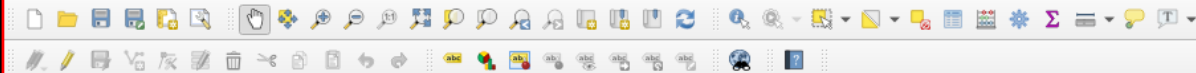
Vector



Real World



Lets start QGIS and make ourself familiar with
it

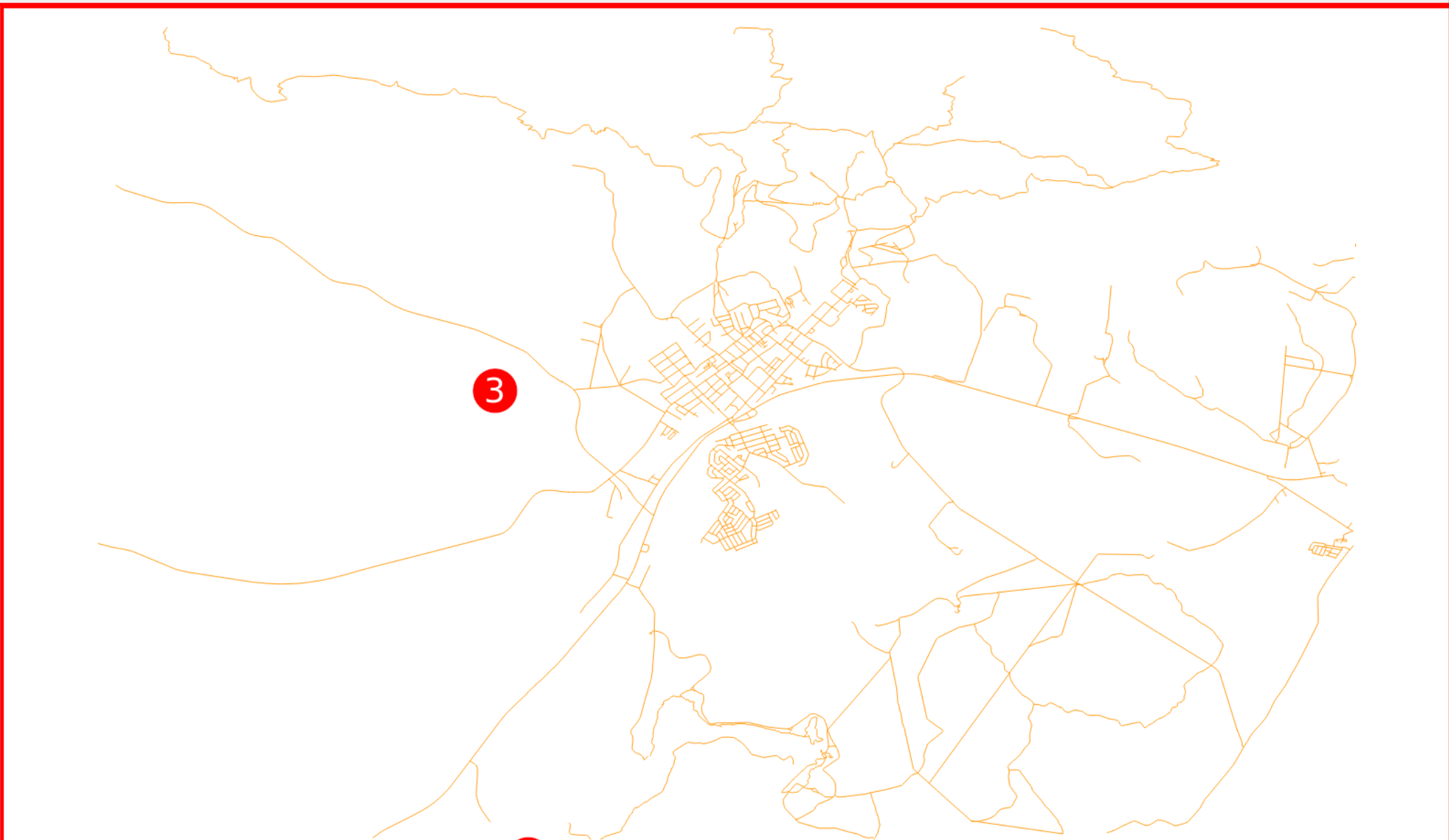


2

Layers

The Layers panel displays a single layer named 'roads' with a checkmark and a line symbol. It includes icons for layer visibility, opacity, and layer management.

1



3

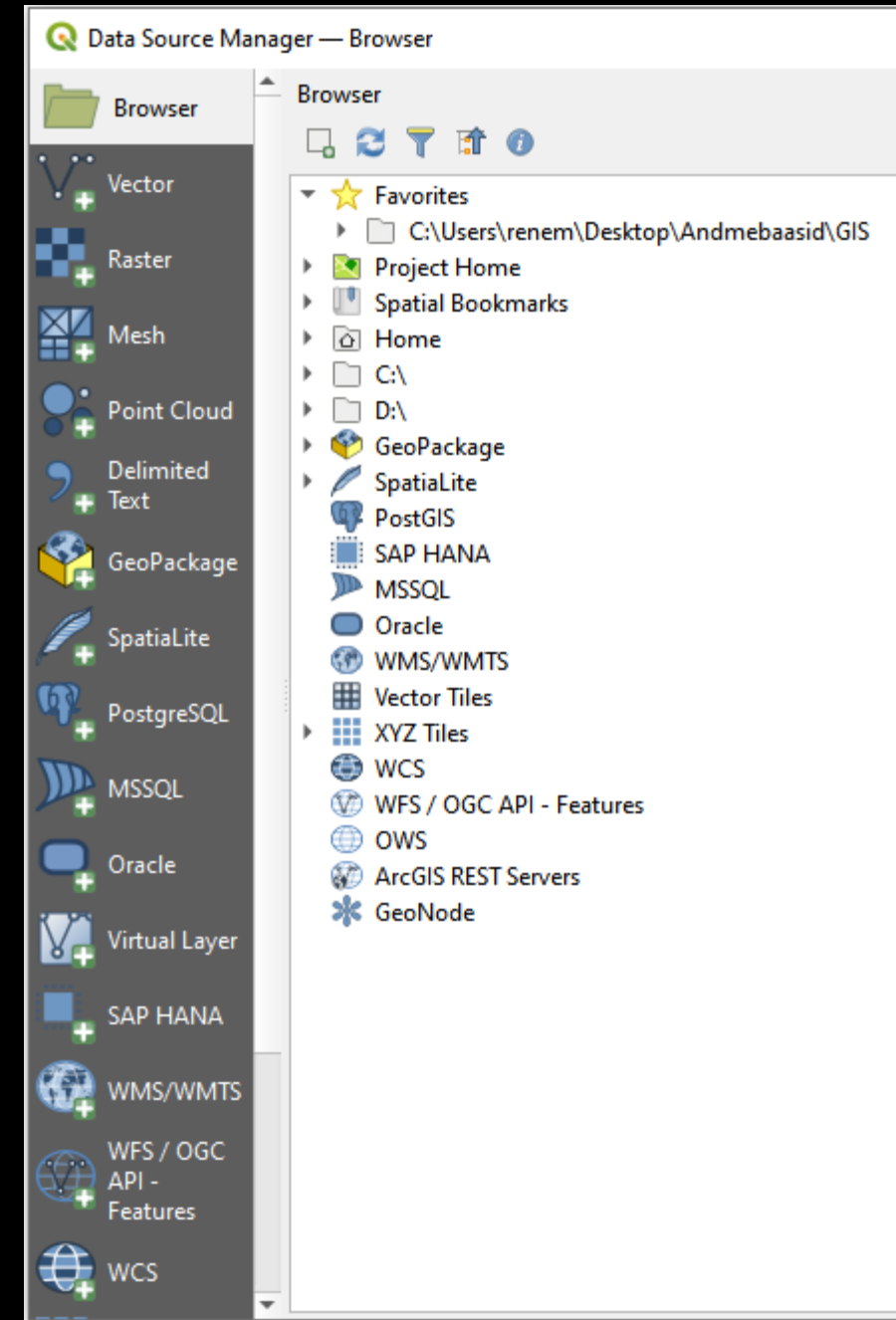
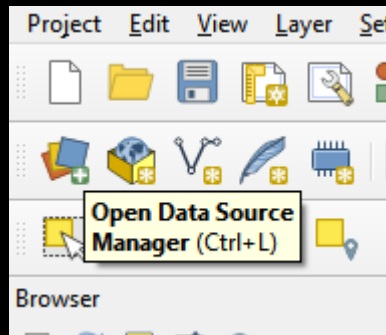
5

4

6

Browser panel

- The *QGIS Browser* is a panel in QGIS that lets you easily navigate in your database (layer) folders



Toolbars



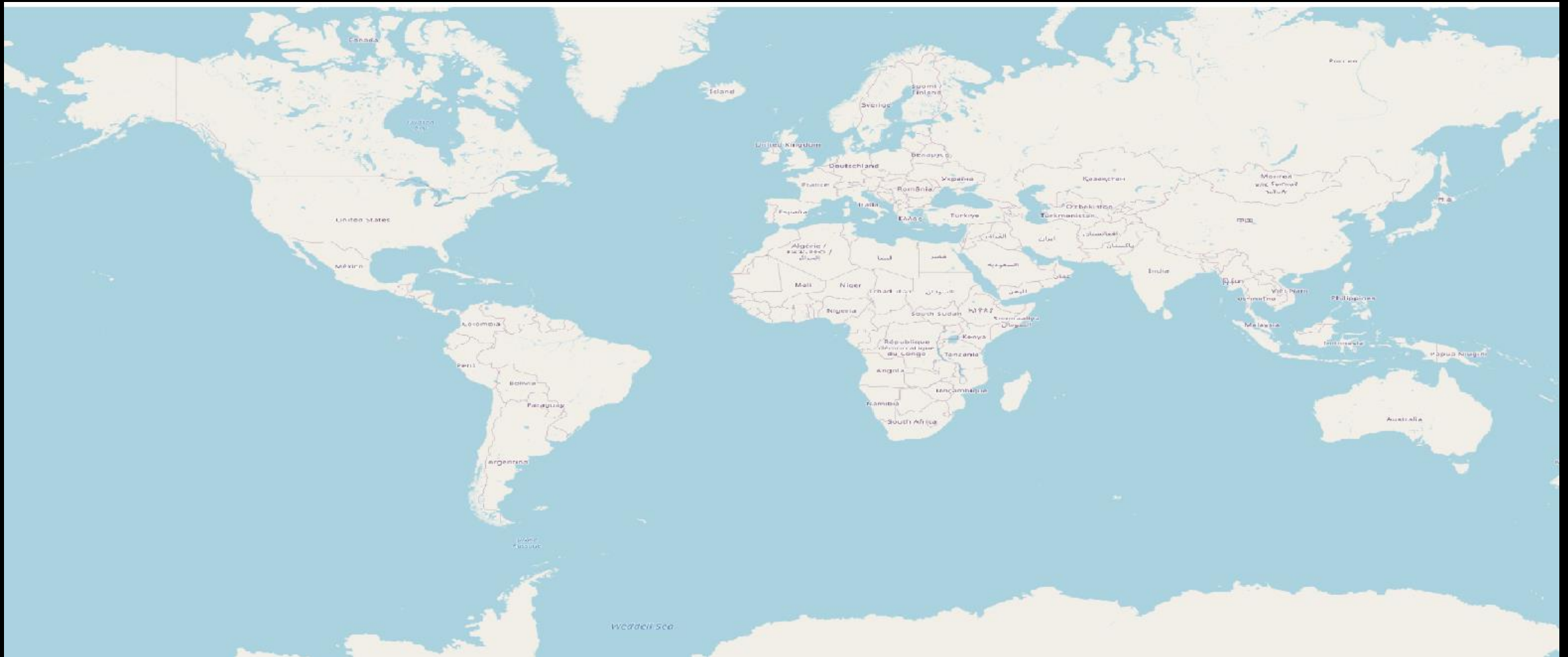
Hidden toolbars

- You can find all other toolbars, that are not present in the first look.
- By clicking right click on the toolbar.

Panels	
<input type="checkbox"/>	Advanced Digitizing Panel
<input type="checkbox"/>	Browser (2) Panel
<input checked="" type="checkbox"/>	Browser Panel
<input type="checkbox"/>	Debugging/Development Tools Panel
<input type="checkbox"/>	GPS Information Panel
<input type="checkbox"/>	Layer Order Panel
<input type="checkbox"/>	Layer Styling Panel
<input checked="" type="checkbox"/>	Layers Panel
<input type="checkbox"/>	Log Messages Panel
<input type="checkbox"/>	Overview Panel
<input type="checkbox"/>	Processing Toolbox Panel
<input type="checkbox"/>	Results Viewer Panel
<input type="checkbox"/>	Spatial Bookmark Manager Panel
<input type="checkbox"/>	Statistics Panel
<input type="checkbox"/>	Temporal Controller Panel
<input type="checkbox"/>	Tile Scale Panel
<input type="checkbox"/>	Undo/Redo Panel

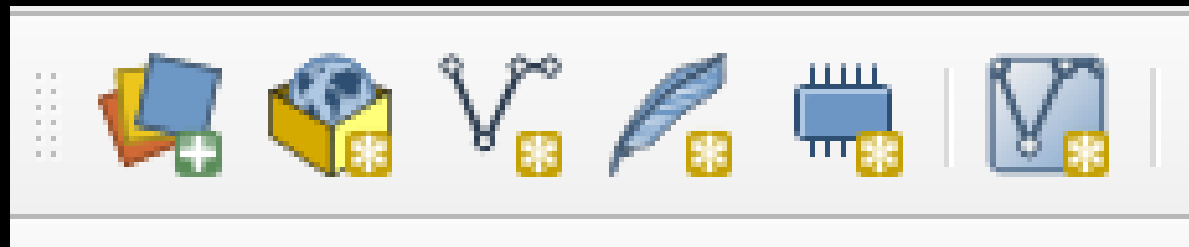
Toolbars	
<input checked="" type="checkbox"/>	Advanced Digitizing Toolbar
<input checked="" type="checkbox"/>	Attributes Toolbar
<input checked="" type="checkbox"/>	Data Source Manager Toolbar
<input type="checkbox"/>	Database Toolbar
<input checked="" type="checkbox"/>	Digitizing Toolbar
<input checked="" type="checkbox"/>	Help Toolbar
<input checked="" type="checkbox"/>	Label Toolbar
<input type="checkbox"/>	Manage Layers Toolbar
<input checked="" type="checkbox"/>	Map Navigation Toolbar
<input checked="" type="checkbox"/>	Plugins Toolbar
<input checked="" type="checkbox"/>	Project Toolbar
<input type="checkbox"/>	Raster Toolbar
<input checked="" type="checkbox"/>	Selection Toolbar
<input type="checkbox"/>	Shape Digitizing Toolbar
<input checked="" type="checkbox"/>	Snapping Toolbar
<input checked="" type="checkbox"/>	Vector Toolbar
<input checked="" type="checkbox"/>	Web Toolbar

The Map Canvas

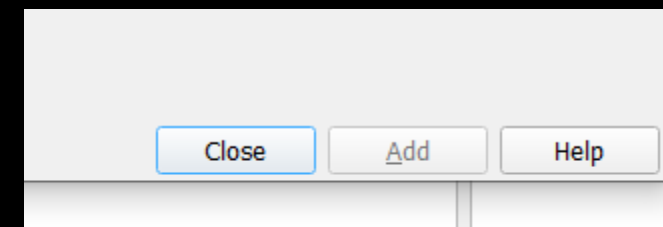
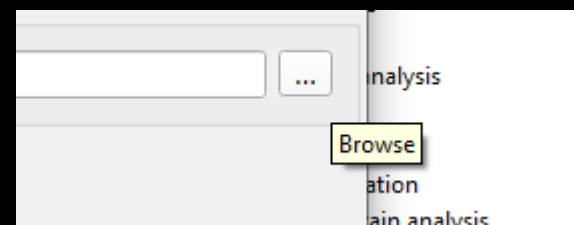
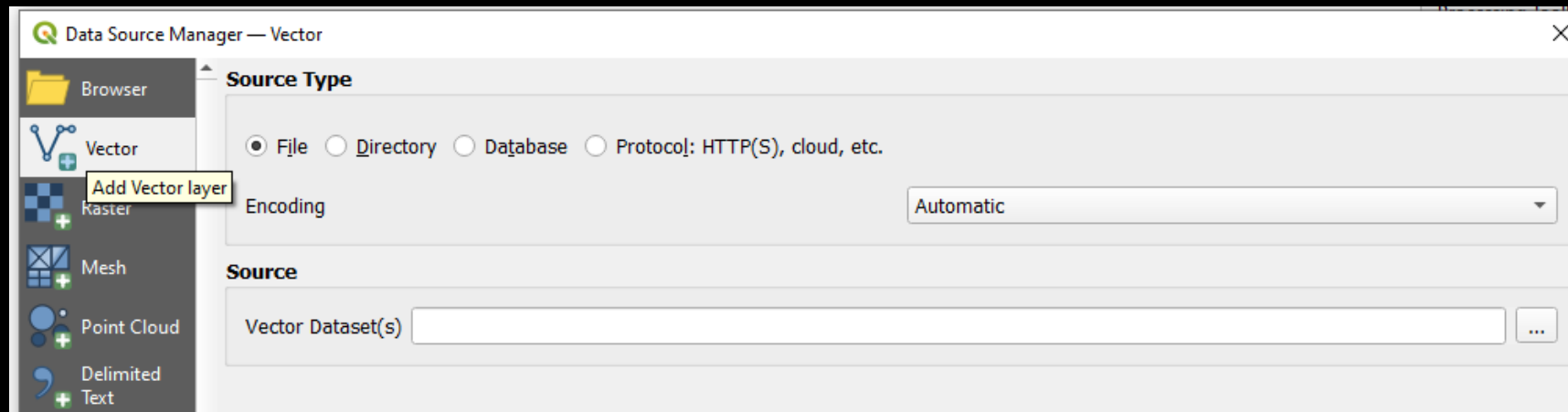
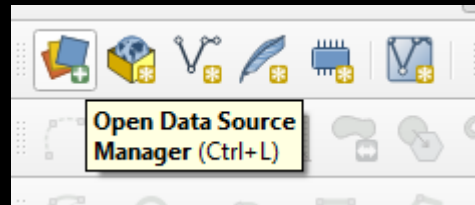


Side toolbar

- It wont be on the side, but we call it like this

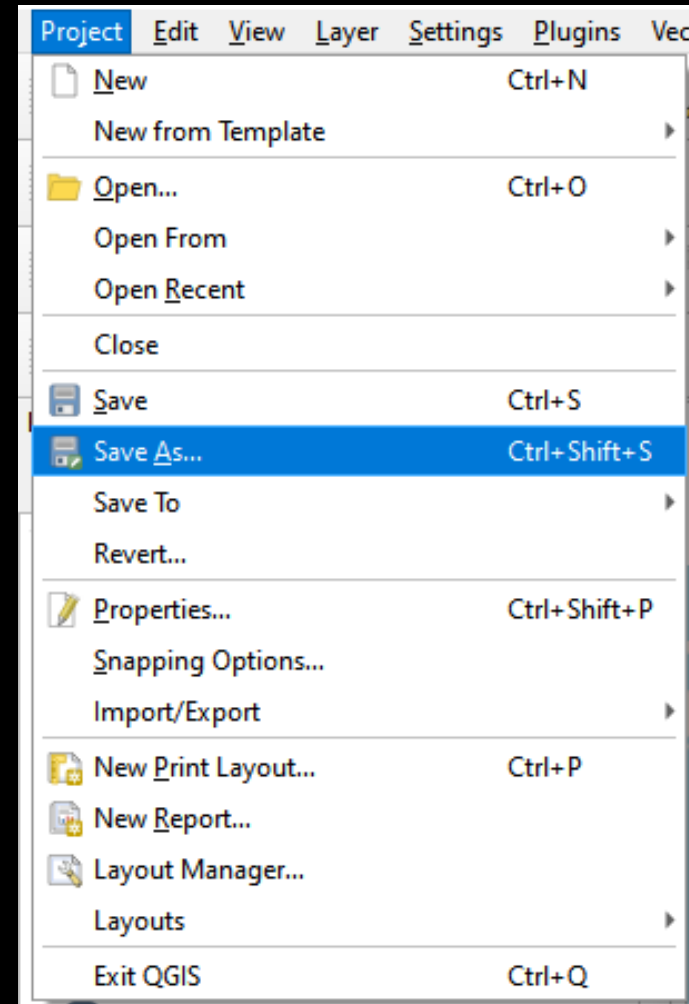


How to import data- process view



How to save a project

- Make folder „**Practise**“ and save your projects there

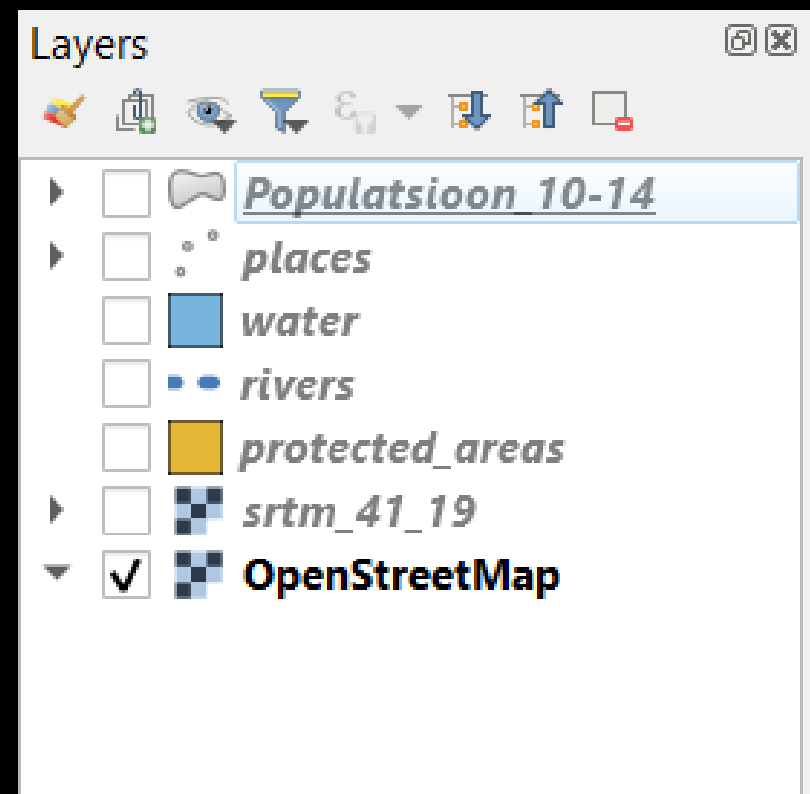


Try to import following layers...

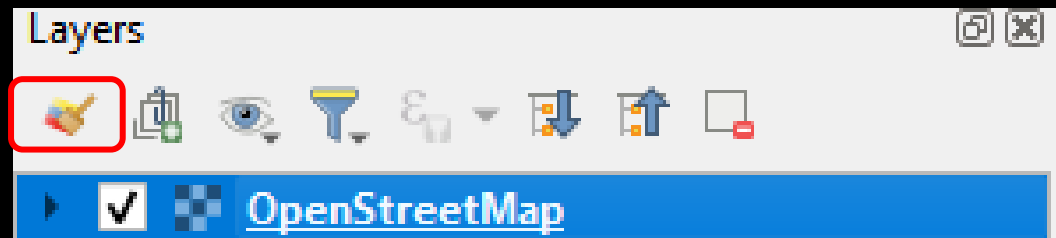
- Places
- Rivers
- Water
- Protected areas
- Save your work!!!

Reordering Layers

- Try to reorder layers so they make any sense visually
- Layer order makes the map canvas look different
 - Some things could otherwise be behind others



How to visualize layers



„Places“ layer symbology

Layer Styling

places

Single Symbol

Marker

- Simple Marker

Color [Color Picker]

Opacity 100.0 %

Size 2.00000 Millimeters

Rotation 0.00 °

Search Favorites

- dot black
- dot white
- dot blue
- dot green

Save Symbol... Advanced

Layer Rendering

Live update Apply

Choose color

Symbology

The screenshot shows the QGIS Layer Properties dialog box for a layer named 'landuse'. The 'Symbology' tab is active, showing a 'Single symbol' configuration. The main area displays a green square representing the current symbol, which is a 'Simple fill' with a green color. Below this, the 'Unit' is set to 'Millimeters', the 'Opacity' is at 100.0%, and the 'Color' is a green swatch.

The 'Favorites' section at the bottom provides a grid of 14 different symbology options:

- gradient plasma
- gray 3 fill
- hashed black /
- hashed black \
- hashed black X
- outline blue
- outline green
- outline red
- outline xpattern
- pattern dot black
- pattern zelda
- simple blue fill
- simple green fill
- simple red fill

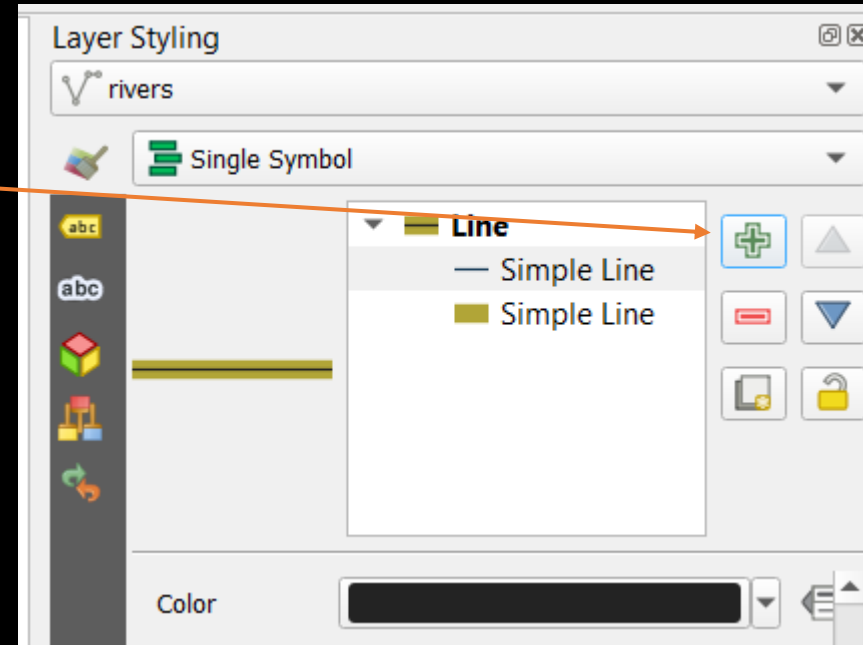
At the bottom right, there are buttons for 'Save Symbol...', 'Advanced', 'Apply', 'Cancel', and 'OK'. The 'Layer Rendering' section at the bottom left includes 'Help' and 'Style' options.

Try yourself

- Change „water“ layer color to blue by yourself

Task-change symbology structure

- Stroke and no stroke
- For stroke add an simple line
- Now two simple lines are included,
- One is for stroke

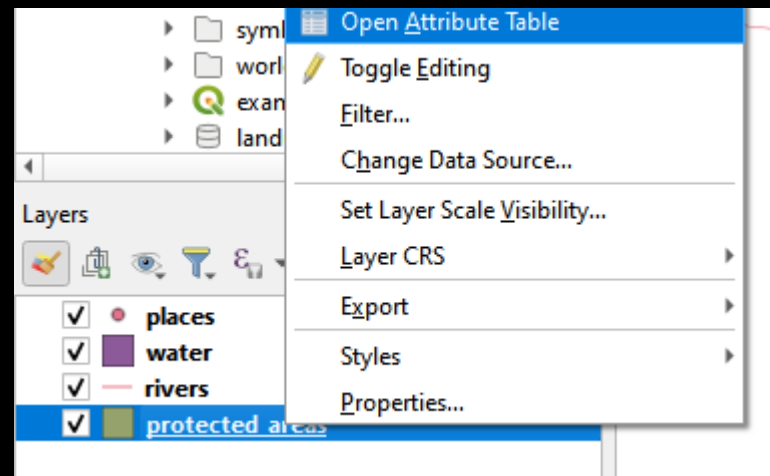


Task

- Change the “**water**” layer’s symbology again so that it has a darker blue outline.
- Change the “**rivers**” layer’s symbology to a sensible presentation of waterways.

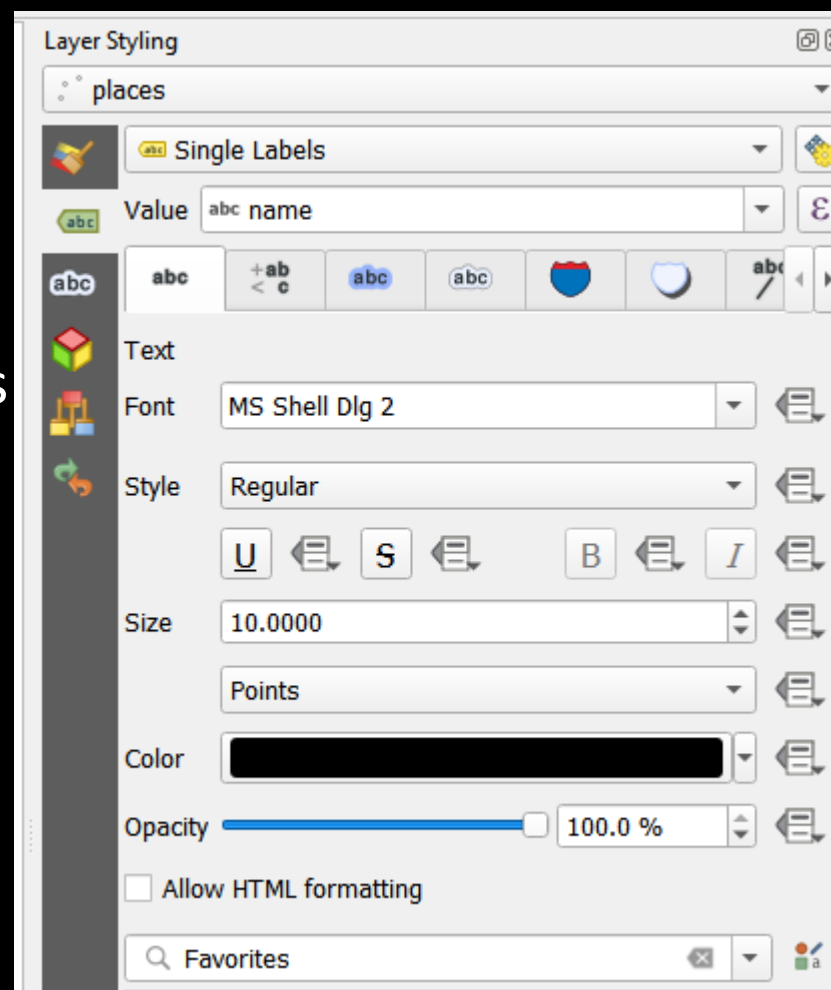
Vector data- where are the attributes?

- Right click on given layer and „**Open attribute table**“



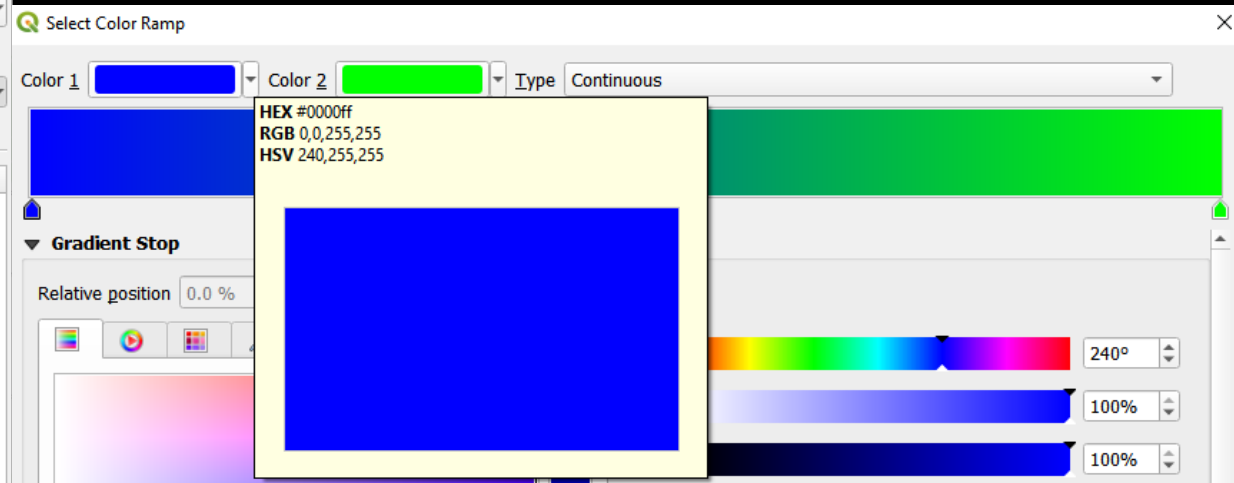
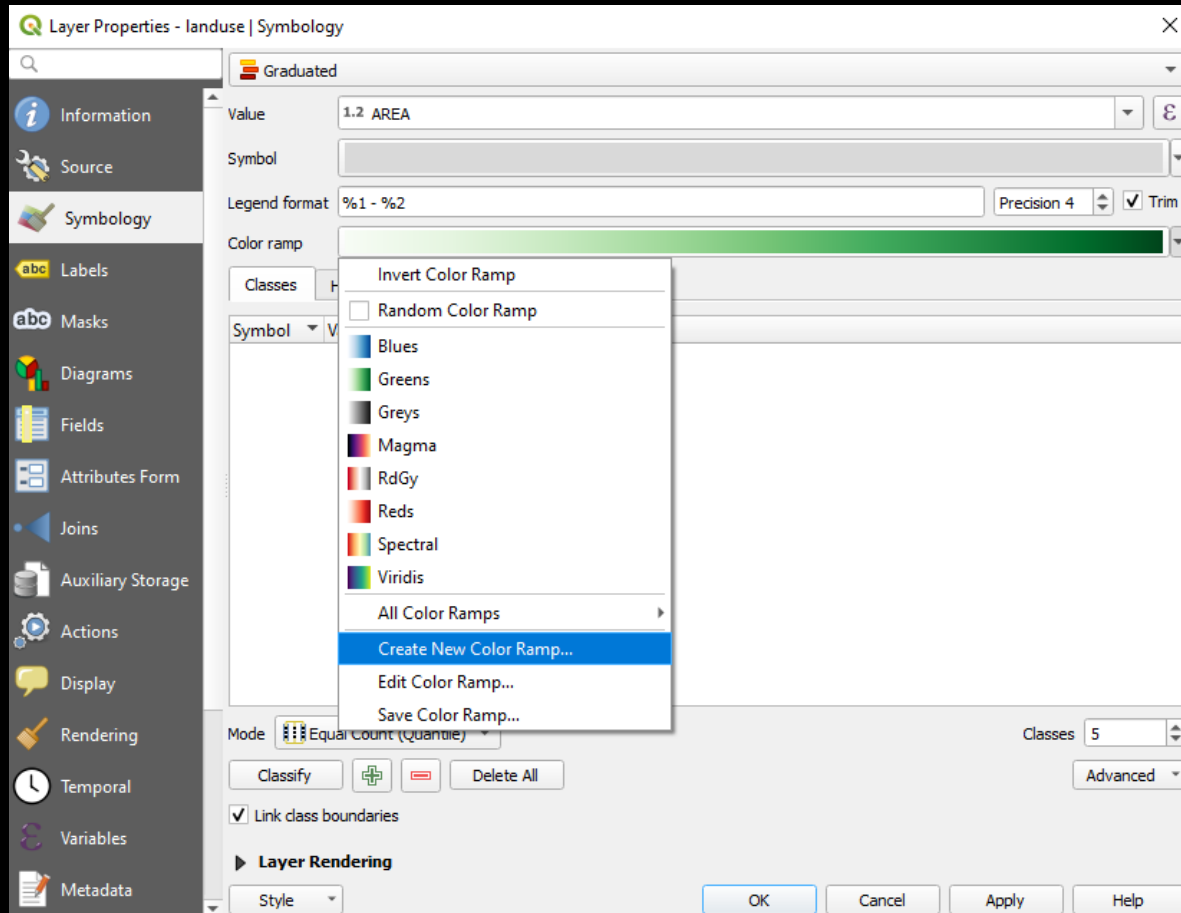
Task-adding labels to vector layer

- Adding labels:
 - Click on layer Styling
 - Find and click on labels tab
 - Value represent visulized attributes



Task- add a „landuse“ layer from „shapefile folder“

Using graduated style visualizing attributes values



Task- add a „landuse“ layer from „shapefile folder“

- Try to use graduated style on layer „AREA“ attribute



Conclusion

- QGIS is one of the many GIS applications
- Layer is a map with one data type (vector, raster) and one topic (buildings, forest, streets)
- Layer order has a significant impact on how things are shown
- Layers visualizing give us a better way to present our findings
- OpenStreetMap is an open/free map with many features (streets, buildings)

Thank you for your attention!

Interreg Central Baltic Project: INTELTRANS – Intelligent Transport and Traffic Management study module.