QGIS Notes

**Table of Contents**

[1.0 Introduction to QGIS 1](#_Toc515285363)

[1.1 Basics 1](#_Toc515285364)

[1.2 Version 1](#_Toc515285365)

[1.3 Learning 4](#_Toc515285366)

[2.0 Examples 5](#_Toc515285367)

[2.1 Timeline elements 5](#_Toc515285368)

[3.0 Data Sources 5](#_Toc515285369)

[4.0 Sustainability and GIS 5](#_Toc515285370)

# **1.0 Introduction to QGIS**

The purpose of geographic information systems is to show physical area, with both natural and man-made features4. A deeper understanding between land and environment/populations are gained from simple stylized interpretations. There are many different types of geographic information systems: Arc GIS, GRASS GIS (geographic resources analysis support system), ArcMap, GeoJSON, HGIS (historical GIS), and TimeMap5. QGIS (Quantum QGIS) is the software used in this research project; it has two interfaces, QGIS Browser and QGIS Server, with the same code rendering, but different front-end interfaces.

When creating your map, it’s important to focus on specific themes, while different features can create a spatial reference.

## **Basics**

There are points, lines, and polygons. Points are the position on the plane of a feature, lines are connected points, and polygons are connected lines to form at loop.

## **Version**

All updates can be found [here](https://qgis.org/en/site/forusers/visualchangelog30/index.html) 6

Version 3.0 7,8

Changes (these ones are the day-to-day changes that we will notice changes around)9

* similar interface
* Background tasks
  + Previously, when a task would be completed there would be a lot of waiting for the task to process. Now 3.0 tries to do that processing in the background. So, you can continue working, while processing is happening in QGIS.
* OTF (On the Fly) Project Changes
  + Changes things in terms of area and distance calculations and whether or not ellipsoid calculations are needed.
  + Project > Project Properties > CRS
  + 2.18: confusing 🡪 apply to only interface of map, not
  + 3.0: more flexibility
    - If people want no projection associated with them (examples local coordinate system, a different planet, made-up map), uncheck button 🡪 treats every coordinate as a number. Every measurement is planar (a Cartesian measurement).
      * When box is checked a program will connect all the coordinate systems added by data and might change units and other adjustments. Everything will line up with different data sets.
* Removal of “Core” Plugins
  + Plugins > Manage and install Plugins
  + 2.18: In any QGIS there are many plugins installed by default, but not enabled. So, each user’s QGIS could interact differently when interacting with shared projects.
  + 3.0 incorporated those plugins into the project automatically into processing. It merged and got rid of many used plugins.
    - Moved to processing: Heatmap, road graph, geometry snapper, raster terrain analysis, interpolation, GDALtools, Spatial query, zonal statistics
* Unified add layers window
  + Making interface easier to interact with, by moving the menu options into a consistent pattern as “properties tab”.
* Exe Load and crash handler
  + When it crashes, the program will locate where the bug was.
* Setting Migration
  + Force a migration of all settings (colors, symbols, data, etc)
* User profiles
  + Settings > Profile
  + Will have isolated plugins and individual set ups.
  + Now can change between profiles
* Node Tool/Move Features Tool
  + Work flow change
  + Not click and drag (now click, click) 🡪 works with CAD dock
  + Multi-feature edits
  + Not as many plugins required for edits
* Enhanced node tools
  + Extending lines, moving modes, adding new nodes
* Project Compatibility
  + When a project started in 1.X it won’t work (will work if project made in 2.X)
* Bump old projects through 2.18
  + Translate nicer when old projects uploaded/saved into the acceding versions (don’t jump versions)
* Processing
  + Each feature has an issue tracker.
* 2.X models are not compatible
  + Need to be rebuilt
  + Previous code had duplicates and little parts that did small parts of a process. Now everything is more condensed. But, developers couldn’t say definitively which processes went where (so projects are not compatible)
* UI Consistency

NEW FEATURES

* + Multi canvas support (View > new map > map view) 🡪 look at a layer in a larger project
    - Sink the windows that pop up to move together.
    - Multiple map views (and dock)
  + 3D!
    - Buildings, trees, terrain
    - View > 3D view 🡪 to have window
  + Search Bar
    - Control K
    - Search actions, layers

New features Examples10,11,12

* CAD digitizing tools built right into version (rectangle, circle, ellipse, shapes+)
* Autocompleted field values (scroll down menu with what you start to type)
* Edit labels (more interactive) - 8 icons on bar
* Style raster layers (unique values and colors / more interactive)
* Unified interface (properties, layer, data source manager pages look and interact the same now)
* Add symbols, text tacked to map
* Many processing algorithms (C++ algorithms / algorithms were optimized and made flexible/stable)
* Multiple Interactive map canvases (snap into/out of window)
* Preview the valid bounds of map projections (validate CRS choices)
* Support for QLR files, print templates, processing models and python scripts in BROWSER
* Locator Search bar (quick access to layers, features, actions, algorithms, plugins)
* Automatic projection of layers in processing algorithms (previously create temporary layers to clip layers in a different CRS)
* 3D map views!
* Auto update field values whenever a feature is modified
* Symbol clipping: create buffers and clip them around labels/symbols (not just geographic data)
* Topological coloring
* Ctrl+TAB to toggle visibility of opened panels.

There are so many features. Highlighted above are only a few to get an idea of what changes are happening. For the continuous [updates/commits](https://github.com/qgis/QGIS-Documentation/issues?q=is%3Aopen+is%3Aissue+milestone%3A%22QGIS+3.0%22) go to the Git QGIS documentation page. To understand the documentation read [this explanation](https://docs.qgis.org/2.18/en/docs/documentation_guidelines/writing.html#introduction). Version 3.x will continue to update and the changelog can be seen [here](http://changelog.qgis.org/en/qgis/) 13.

API

Application Programming Interface (API) is the basis for building application software. It was a software library that helps it communicate between different software components.

API and QGIS

The API in QGIS needed to be broken, because created dependencies that were no longer needed. This allows higher level refactoring, new features, infrastructure tasks, and miscellaneous. All the services (where data is collected) like WMS GetMap, WFS, GetFeature, GetLegendGraphics, WCS, GetPrint, etc…) were recoded14.

QGIS Version 3.0: Conclusion

Pros: Parallel updating of Qt5/PyQt5/Phython3 until they work together. Two efforts have been run: the version update and about every 4 months updates. Has many new updates. Seems to make interface and interactions more user friendly and consistent throughout QGIS operations15. As the research project progresses, we want to change and adapt with the program. This will stay compatible throughout the research.

Cons: Not compatible with previous work. Features from 2.18 update won’t be compatible to version 3.0 version update. So, they will have to dual commit. Large changes in basic code (combining, adding, deleting plugins)15. Broke the API, which makes it incompatible14. Not as “reliable as 2.18” yet6. Version 2.18 is the LTR (long term release) right now, and is more stable then QGIS version 3.0.

Side Note: the language I was reading was very similar to the language around GIT (commit, master branches, new features, etc.). It does use GIT!

## **1.3 Learning**

Training manual for historians and historical social scientists.23

<http://www2.isu.edu/departments/history/gismanual.shtml>

Geospatial Historian has humanitarian GIS training24.

<https://geospatialhistorian.wordpress.com>

Refer [here](https://docs.qgis.org/2.18/en/docs/user_manual/) for QGIS user guide 1

Refer [here](https://sophia.smith.edu/gis-modules/) for modules2 \*\* Good

Refer [here](https://docs.qgis.org/2.18/en/docs/training_manual/) for training manual3

Places to look for GIS information

* Digital Geography
* Flickr Map showcase/photos
* QGIS.org blog20
* Northroad
* Cadline Community
* Stack Exchange21

# **2.0 Examples**

QGIS allows for many projections of land and features layered on top of each other through a geometric network. Some modeling examples are topological, hydrological, and cartographic modeling. Other system features are map overlay, geostatistics, geocoding, and graphic display techniques. I collects characteristics from maps and projects that might be helpful in the visualization of this research project.

## **2.1 Timeline elements**

Creating Timeline Gif (in QGIS) 16

Great example17, but done with ArcGIS. TimeMap is a web mapping application5. HGIS is a process of layering old maps over new maps18.

The Heartbeat of a region (in ArcGIS)17

Analysis the traffic patterns in a city and shows intensity in a Gif.

African American and Latino migration is the United States22

# **3.0 Data Sources**

Locations: OpenStreetMap (crowdsourcing, Open Layers (custom applications), Ordnance Survey, NASA, USGS, Natural Resources of Canada, Esri.

Make road routs ([here](https://maps.openrouteservice.org/directions?n1=49.409445&n2=8.692953&n3=13&b=0&k1=en-US&k2=km))19

# **4.0 Sustainability and GIS**

QUESTION

* GIS active domain
  + Sync up server? (move around computers)
* How do I get QGIS desktop (what’s the difference between desktop and server)

Resources

1. QGIS User Guide. Available at: https://docs.qgis.org/2.18/en/docs/user\_manual/. (Accessed: 28th May 2018)

2. GIS Modules – Smith College Project.

3. QGIS Training Manual. Available at: https://docs.qgis.org/2.18/en/docs/training\_manual/. (Accessed: 28th May 2018)

4. richard-datapolitan. Subway Ridership. *CARTO* Available at: https://richard-datapolitan.carto.com/viz/c0d4f39e-962e-11e4-9b3b-0e9d821ea90d/embed\_map. (Accessed: 28th May 2018)

5. ECAI - Electronic Cultural Atlas Initiative. Available at: http://ecai.org/tech/timemap07.html. (Accessed: 28th May 2018)

6. Changelog for QGIS 3.0. Available at: https://qgis.org/en/site/forusers/visualchangelog30/index.html. (Accessed: 28th May 2018)

7. Sutton, T. Help us to plan for QGIS 3.0. *QGIS.org blog* (2016).

8. Evers, K. *proj.4: PROJ.4 - Cartographic Projections Library*. (2018).

9. North Road. *QGIS Australia User Meetup 2017: QGIS 3.0 What End Users Need to Know*.

10. Short Announcement: QGIS 3.0 is on its way. *Digital Geography* (2017).

11. 24 Days of QGIS 3.0 Features – North Road.

12. Sutton, T. Let’s make a big funding push for QGIS 3.0! *QGIS.org blog* (2016).

13. Projecta: QGIS. Available at: http://changelog.qgis.org/en/qgis/. (Accessed: 28th May 2018)

14. underdark. QGIS Server refactoring is done! *QGIS.org blog* (2017).

15. Sutton, T. QGIS 3.0 plans. *QGIS.org blog* (2016).

16. QGIS Archives. *Digital Geography*

17. The Heartbeat of a Region | GeoNet. Available at: https://community.esri.com/groups/geodev-germany/blog/2017/12/28/the-heartbeat-of-a-region. (Accessed: 28th May 2018)

18. Historical GIS Research Network. Available at: http://www.hgis.org.uk/what\_is.htm. (Accessed: 28th May 2018)

19. Openrouteservice Maps. Available at: https://maps.openrouteservice.org/directions?n1=49.409445&n2=8.692953&n3=13&b=0&k1=en-US&k2=km. (Accessed: 28th May 2018)

20. QGIS.org blog. *QGIS.org blog* Available at: http://blog.qgis.org/. (Accessed: 28th May 2018)

21. Distinction between Difference and Clip tools in QGIS? *Geographic Information Systems Stack Exchange* Available at: https://gis.stackexchange.com/questions/76839/distinction-between-difference-and-clip-tools-in-qgis. (Accessed: 28th May 2018)

22. American Migrations. Available at: http://ammig.gisforhistory.org/. (Accessed: 28th May 2018)

23. Scribd. *Scribd* Available at: https://www.scribd.com/embeds/225789617/content?start\_page=1&view\_mode=scroll&access\_key=key-L1U5Xy7SjCkcwwgndKLN&show\_recommendations=true. (Accessed: 28th May 2018)

24. Geospatial Historian. *Geospatial Historian* Available at: https://geospatialhistorian.wordpress.com/. (Accessed: 28th May 2018)

Go into further

<https://nyalldawson.net/2017/02/new-map-coloring-algorithms-in-qgis-3-0/>

<http://www.hgis.org.uk/what_is.htm>