

# Introduction to Open Source Geospatial Tools

## Boomerang Geospatial

### Course Report

**Instructor:** Maggie Cawley

**Length of Course:** 5 days

**Dates:** September 21 to 25, 2015 / 09:00 to 16:00

**Roster:** 27 participants from public and private sectors

### Course Summary

This 5-day course provided an introduction to QGIS 2.8, an alternative Open Source GIS software for viewing, editing, and managing spatial data in a wide variety of commonly used vector and raster formats. This introduction familiarized participants with the interface and many tools and features that will allow viewing, editing, analyzing, creating, managing, and serving GIS data in a variety of formats.

Participants learned how to create new GIS data, edit data, collect and create data, manage plugins, convert data from one format to another and symbolize it on a map. Participants were introduced to basic field data collection techniques, cloud-based mapping resources, OpenStreetMap, and other geospatial tools.

### Learning Outcomes

- Students demonstrated proficiency in the basic functions of geospatial software, including editing and data management.
- Students were able to run geoprocessing tools individually within QGIS and find the appropriate plugins.
- Students demonstrated basic proficiency in map creation and design principles, including thematic map display and cartographic design.
- Students used cloud-based tools to create their own web maps.
- Students used field collection techniques to develop a map of the University campus on OSM.

### Module Map

Day #	Lecture
1	Introduction to QGIS & mapping techniques



3	The power of open data – OpenStreetMap & QGIS
2	Data collection, case studies, raster styling & remote sensing in QGIS
4	Web Maps & Cloud-based spatial tools - CartoDB Academy
5	Using GPS in QGIS, Creating Contours, Coastal Analysis

## Detailed Course Description & Outcomes

### Day 1 – Introduction to QGIS & Mapping Techniques

Monday began with introductions and a review of the upcoming week. The day one lecture covered the following topics:

- Introduction to maps and Geographic Information Systems (GIS)
- History of GIS
- Introduction to cartography
- Basic functions of QGIS (viewing data, downloading data, converting files)

The first day students were given two labs. The first lab was guided and it covered the following skills:

- Find and download spatial data
- Upload data to QGIS
- Symbolize the data in QGIS
- Investigate the data attributes
- Compose, design, and print a map of your data

During the afternoon, students working independently on Lab 2, which covered the following skills in QGIS:

- How to join tables of existing data to shapefiles
- Simplify geographic features
- Convert shapefiles to different data formats
- Create and edit vector data



## Day 2 – The Power of Open Data

Tuesday began with a recap of the previous day. The day two lecture covered the following topics:

- Introduction to OpenStreetMap (OSM)
- Editing in OSM
- Field Papers - getting data into OSM
- QGIS & OSM - downloading the data
- Practice editing in OSM

In addition to making edits throughout Mauritius, students spent part of the morning mapping the University of Mauritius campus using Field Papers. Students were each given a page of the atlas (Illustration 1) and spent 20 minutes outside walking around adding detail to the map.

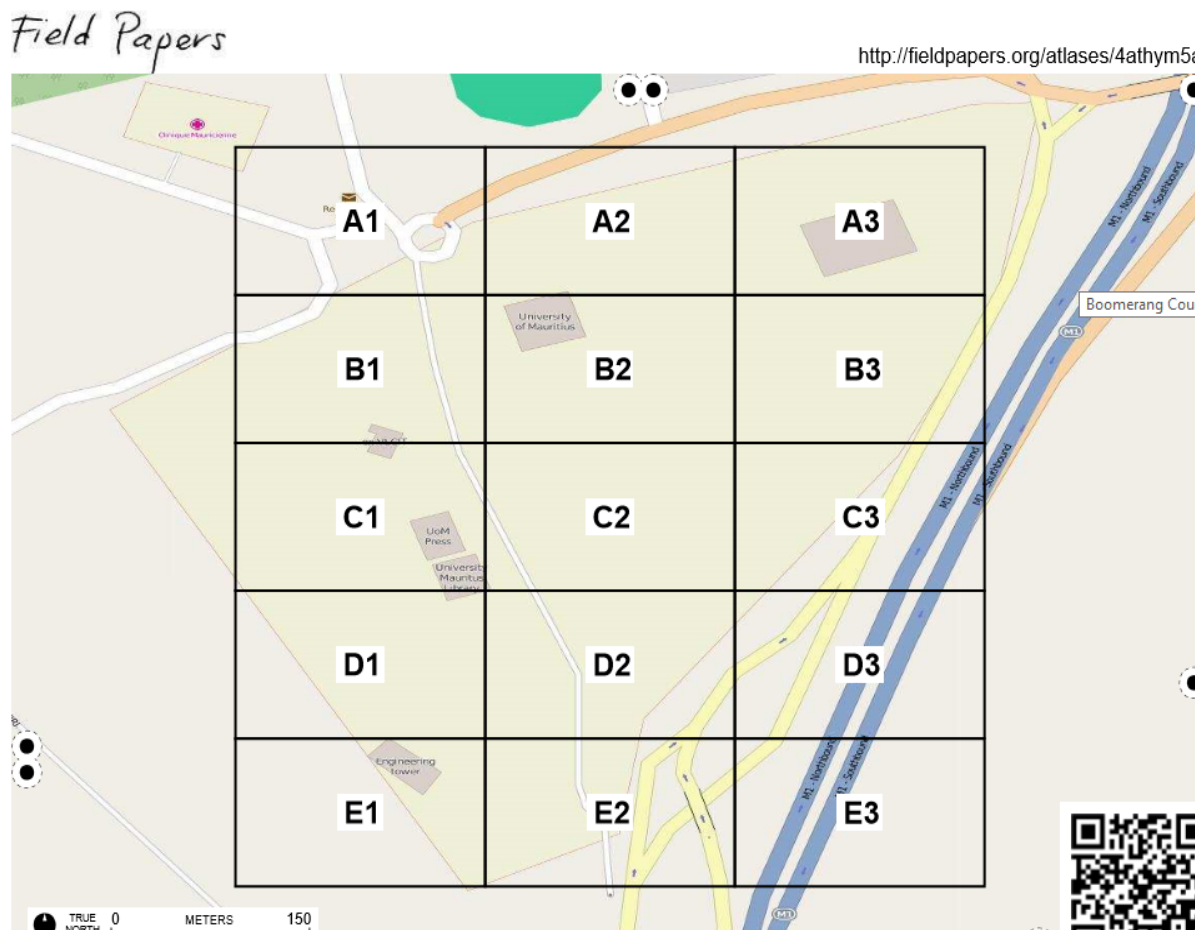


Illustration 1: Field Papers Atlas of OSM University Campus. Created September 21, 2015





At the end of the day, each atlas page was scanned in as a jpeg so that students could then trace their edits in OpenStreetMap during Friday's class. Illustrations 2 and 3 are maps created by two of the participants. By the end of the week, students had created a much more detailed map of the University that is now viewable and editable in OpenStreetMap. Illustration 4 is a screenshot from OpenStreetMap taken on the final day of the course after students traced Field Papers into the OSM database ([www.openstreetmap.org](http://www.openstreetmap.org)).



*Illustration 4: Screenshot of OSM University Campus taken September 25, 2015*

### **Day 3 – Data Collection, Case Studies, & Land Classification in QGIS**

Wednesday began with a recap of the previous day. Time was spent in the field demonstrating the use of a Garmin GPS and how a drone can be used for data collection. Illustration 5 is one image taken during the drone demonstration. The day three lecture covered the following topics:

- QGIS use in the field - Case studies
- Data collection – methods and applications (GPS, drones, satellites, field collection skills)





- Basics of remote sensing
- Raster styling in QGIS
- Accessing Landsat data on the USGS website
- Accessing data on SEDAC
- Land classification in QGIS



*Illustration 5: Photograph of University taken from drone*

#### **Day 4 – Cloud-based GIS tools**

Thursday began with a recap of the previous day. The day four lecture provided an introduction to cloud-based geospatial tools and web mapping. The following resources were demonstrated: BatchGeo, Field Papers, CartoDB, Leaflet, MapBox, Open Cage Geocoder, Google Sheets, Map Story and EasyGPS. During the afternoon the students completed Lab 5, which taught them how to make online maps with CartoDB, zip a shapefile, upload data to CartoDB, style online maps, and publish a web map of



*Illustration 6: Student web map*



Mauritius Districts and a vector file (Illustration 6). The 5 lessons on the [CartoDB Academy](#) provided a good base to begin developing online maps. In this course, students learned how to do the following:

- Work with data tables to create interactive map visualizations
- Explore map styling, adding multiple data sets, and experiment with different data displays
- Share visualizations with others

### **Day 5 – Multiple Skill-sets: Contours, Coastal Analysis, Georeferencing**

Friday began with a recap of the previous day. Day five was spent teaching skills requested by the students throughout the week. A film crew was also on hand from the Adaptation Fund, and an additional drone demonstration was provided (Illustration 7). The following resources were described and demonstrated through a multi-series Lab:

- How to use GPS data in QGIS
- Uploading x,y data into QGIS
- How to georeference an historical map of Mauritius in QGIS
- How to upload and trace Field Papers in OSM
- Create contours using a DEM file to do coastal elevation analysis



*Illustration 7: Drone Demonstration*



*Illustration 8: Students using Field Papers*







*Illustration 9: Introduction to Open Source Geospatial Tools Class of 2015*



*Illustration 10: Students in the classroom*