Training on Quantum Geographic Information System (QGIS)-III

6-9 February, 2017

BRAC CDM, Savar & Bangladesh Bureau of Statistics

UN-REDD PROGRAMME

FAO UNDP UNEP

The Forest Department of Bangladesh leads actions to improve forest management and conservation, adopting forward thinking, innovative approaches in its management of approximately 1.55 million hectares of land across the country.

In 2015, the Forest Department began a process to establish a National Forest Inventory and Satellite Land Monitoring System for improved forest and natural resource management. The process supports national objectives related to climate change mitigation and provides information in support of the UN REDD programme aimed at Reducing Emissions from Deforestation and Forest Degradation (REDD+). The process also addresses domestic information needs and supports national policy processes related to forests and the multitude of interconnected human and environmental systems that forests support.

The activities implemented under the Bangladesh Forest Inventory process are collaboration between several national and international institutions and stakeholders. National partners from multiple government departments and agencies assist in providing a nationally coordinated approach to land management. International partners, including the United Stated Agency for International Development (USAID), the Food and Agriculture Organization of the United Nations (FAO) and SilvaCarbon are supporting the development of technical and financial resources that will assist in institutionalizing the process.

The results will allow the Forest Department to provide regular, updated information about the status of trees and forests for a multitude of purposes including for assessment of role of trees for firewood, medicines, timber, climate change mitigation.

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Disclaimer

This report is designed to reflect the activities and progress related to the Bangladesh Forest Inventory process. This report is not authoritative information sources – it does not reflect the official position of the supporting international agencies including USAID, FAO or SilvaCarbon and should not be used for official purposes. Should readers find any errors in the document or would like to provide comments for improving its quality they are encouraged to contact one of above contacts.

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1. Background

The first national forest inventory for Bangladesh was implemented in the year 2005 with the support from FAO. The inventory was conducted using a systematic sampling design, based on measurement of 299 plots distributed across the entire country. Based on the existing national forest assessment data and additional accessible field inventory and model data, the aim of this training is to provide support on data management and analysis, quality control and assurance.

Field Papers is a web based tool developed by Stamen Design which creates printable map atlases for anywhere in the world that can be taken out into the field. Notes and sketches can be applied directly to the print out, which can then be photographed or scanned and uploaded back to the website. User doesn't need a GPS to make a map or learn complicated desktop GIS software to use Field Papers. This project is a continuation of Walking Papers, which was built for the OpenStreetMap (OSM) editing community. Field Papers allows to print multiple-page atlases using several map styles (including satellite imagery and black and white cartography to save ink) and has built in note annotation tools with GIS format downloads. Even though user can use Field Papers without creating an account.

OpenStreetMap (OSM) is a collaborative project to create a free editable map of the world. The creation and growth of OSM has been motivated by restrictions on use or availability of map information across much of the world, and the advent of inexpensive portable satellite navigation devices. OSM is considered a prominent example of volunteered geographic information.

QGIS (previously known as Quantum GIS) is a community driven free and open-source desktop geographic information system (GIS) application that provides data viewing, editing, and analysis. Similar to other software GIS systems, QGIS allows users to create maps with many layers using different map projections. Maps can be assembled in different formats and for different uses. QGIS allows maps to be composed of raster or vector layers. Different kinds of raster images are supported, and the software can georeference images. QGIS has a small file size compared to commercial GIS's and requires less RAM and processing power; hence it can be used on older hardware or running simultaneously with other applications where CPU power may be limited. QGIS supports dxf, shapefiles, coverages, and personal geodatabases. MapInfo, PostGIS, and a number of other formats. Web services, including Web Map Service and Web Feature Service, are also supported to allow use of data from external sources.

A number of public and private organizations have adopted QGIS. Innovative use of QGIS plugins such as Open Street Map (OSM) may also provide efficiencies for the inventory process. OSM's functionality that provides geo-referenced printed maps that can be marked in the field and then uploaded and digitized may be useful for monumenting permanent sample inventory plots and assist in the archiving process.

Objective

- Identify baseline capacity of GIS capacity external to RIMS
- Increase sustainability of GIS capacity at FD by targeting participants outside of RIMS

- Increase capacity on basic GIS operations

Used Methodology

The training followed a structured and sequential method on the basis of the needs and the training methodology was fully interactive and hands on with the participation of 14 forest officers and RIMs officials.

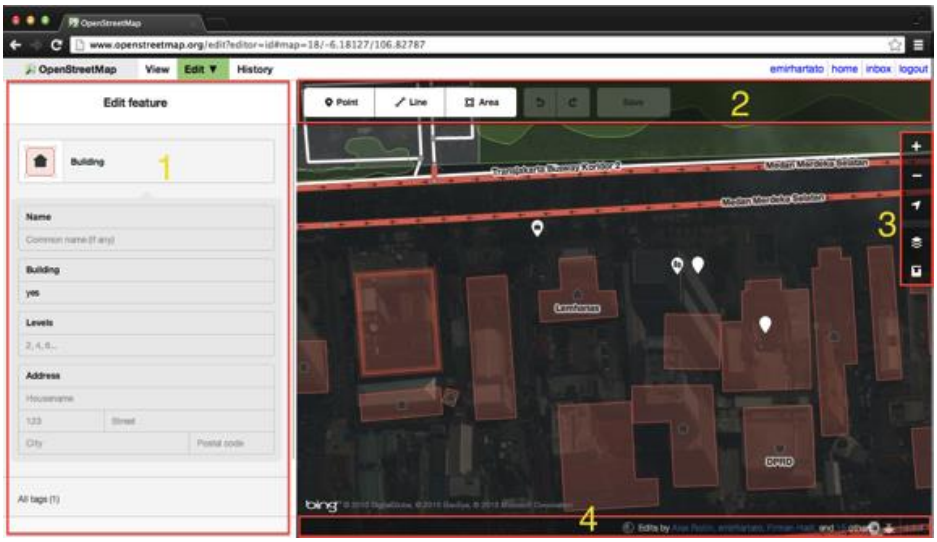
- Participants went to the pilot social forest area to map the forest cover using fieldpapers.
- Printed agenda was provided to all the participants and all were presented and discussed in an easy, understandable manner.
- All the training sessions were interactive and the questions and difficulties were solved during practice session.
- All the participants were tested to know their enhanced capacity through a subject oriented test.

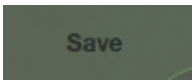
2. Basic Introduction on OpenStreetMap

2.1 Starting the iD Editor

- To use iD you will need to be connected to the internet.
- Open your internet browser, and go to the OpenStreetMap website at http://www.openstreetmap.org.
- **Login** using your OpenStreetMap account
- Pan and zoom the map to the area that you want to edit.
- Click on the small arrow next to **Edit**. Then click **Edit with ID (in-browser editor)**.

iD Editor User Interface

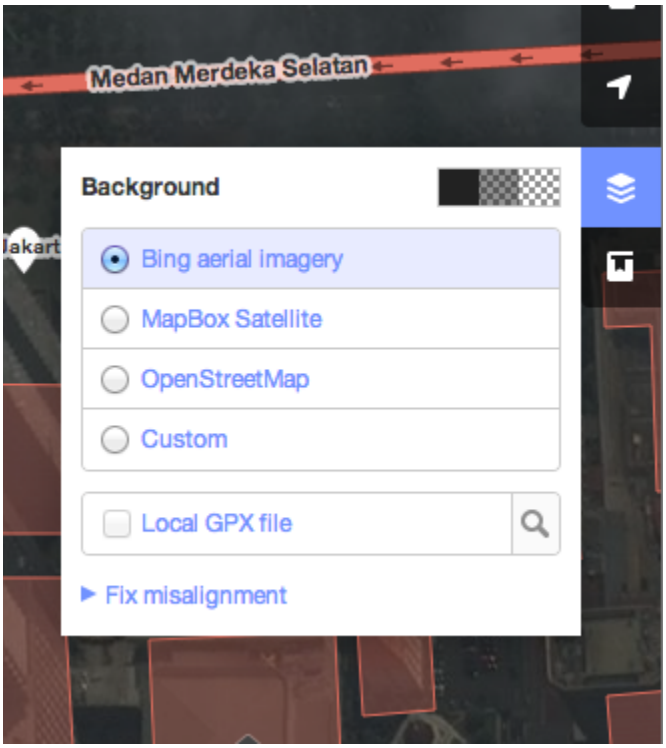


1. **Feature Panel:** This panel shows tags from the object selected on the map. You can add or edit tags from this panel.
2. **Tools:** This panel shows basic editing tools:
   - Draw point
   - Draw line
   - Draw shape (polygon)
   - Undo
   - Redo
   - Save changes 
3. **Map panel:** This panel show various configuration functions:
   - Zoom In
   - Zoom Out
   - Go to your location
   - Configure background layer
   - Open Help Menu
4. **Information panel:** This panel shows various information, such as which users have contributed to the area.

2.2 Configuring the Background Layer

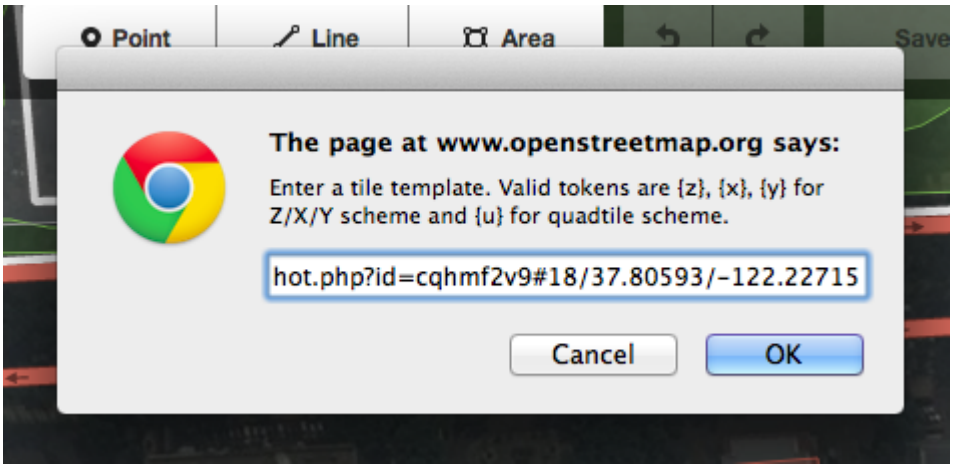
Before you start editing, you can change the background layer.

- Click the **Background settings** button.
- You will see a panel like this:

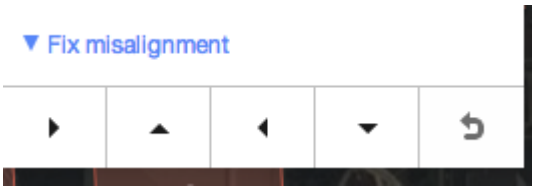


- You can change the **brightness level** by clicking one of these boxes:
- There are 3 different brightness levels - 100%, 50%, and 0%. Click all of them to see the difference.
- You also can **change the background layer** based on your desired tile provider (the default is Bing Aerial Imagery). Try the various options available from this list.
- You can add your own map tiles by clicking on **Custom**.
- For example, if you want to **add a Field Paper**, click **Custom** and enter your **FieldPaper snapshot URL**, which will be something like this:

  http://fieldpapers.org/snapshot.php?id=cqhmf2v9#18/37.80593/-122.22715



- You also can **display GPS tracks from your computer** (GPX format). It is very easy - just drag the GPX file into ID editor.
- If there is imagery offset, you can **correct the imagery offset** by clicking Fix Misalignment.



- Click the navigation buttons to move the imagery. Click the reset button to return to the default position.

2.3 How to Upload GPS Data ?

1. Go to the main OSM page.
2. Login (remember you need an OSM account by signing up here).
3. Click “GPS traces” along the top.
4. Click on "See just your traces, or upload a trace".
5. In the 3 boxes at the top do the following:
    1. Find and select the file you wish to upload (it should be **.gpx**format)
    2. Name the file.
    3. Add helpful tags that can be used to find it such as “London UK” (each word is a tag in itself, so Isle of Wight should be "IOW" or "Isle-of-wight").
6. If you would like your data to be available to others (encouraged) tick the "Public?" box.
7. Click "Upload".

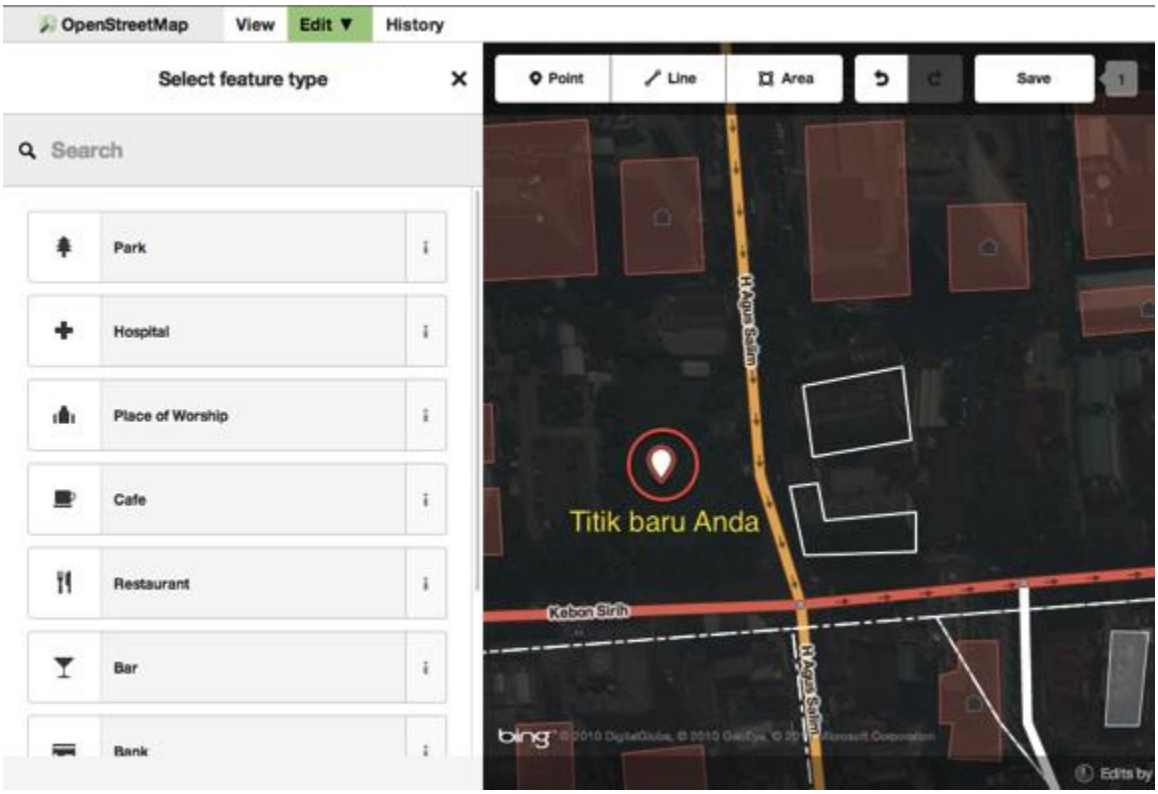
8. The data will now take a short while to be included into OSM. However, as soon as you've uploaded it, you can immediately use it.

2.4 BASIC EDITING WITH iD

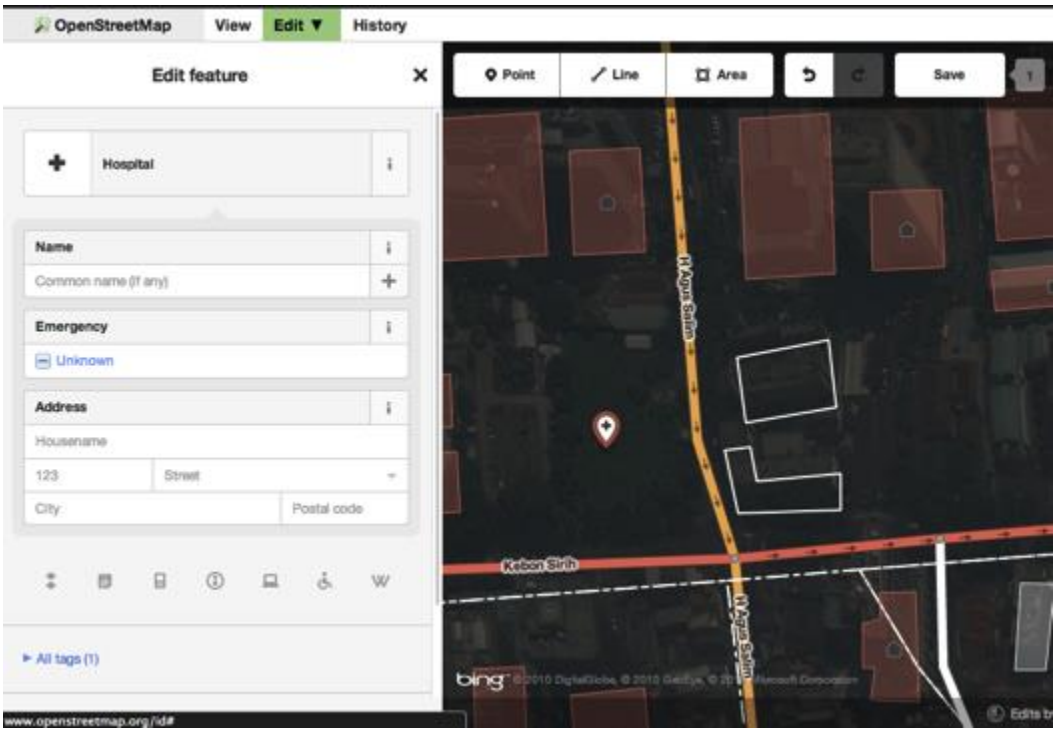
Before we start practicing with iD, **pan and zoom to a location that you familiar with**. You can pan by holding the left mouse button and dragging the map to your desired area.

Adding Points

- To add a new point, click on the **Point** button.
- Your mouse cursor will change into plus (+) sign. Now, click on a position that you know to mark a location. For example, if you know that there is a hospital in your area, click on the hospital building.



- Notice that a new point is added. At the same time, the left panel will change to show a form where you can select attributes for the object. Click **Hospital** to tag the point as a hospital.



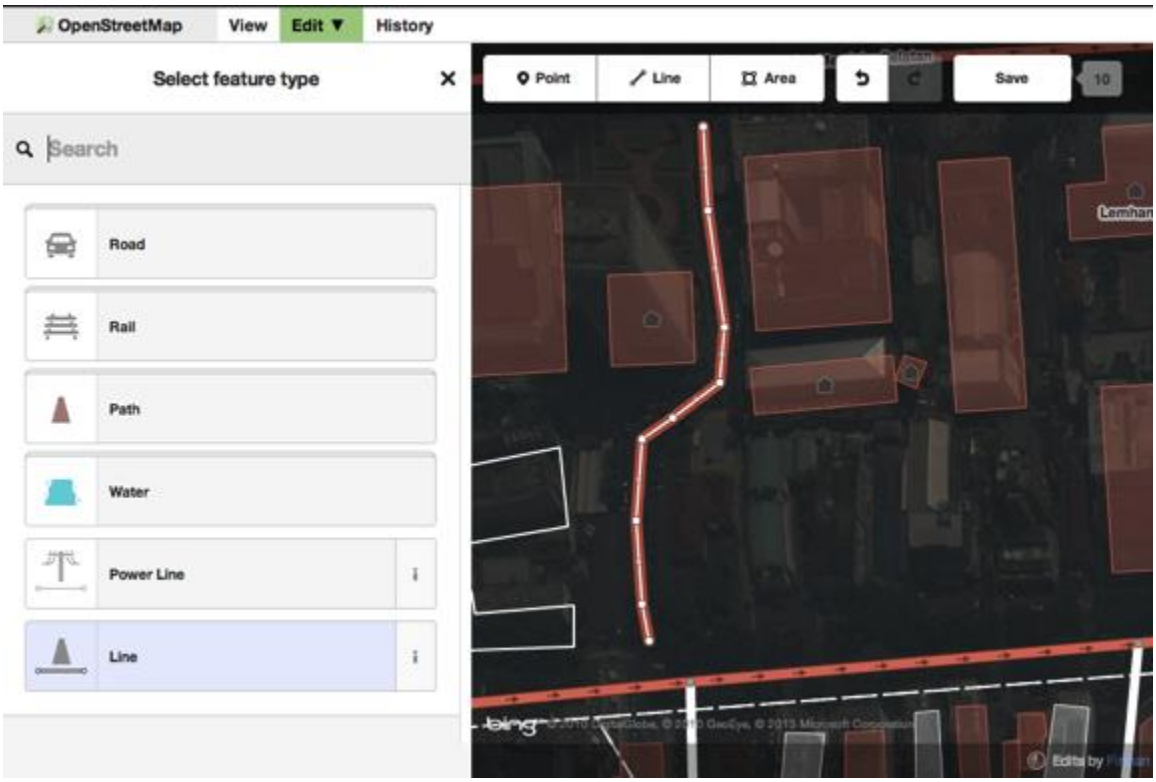
- You can use the forms to fill detail information about your point. You can fill hospital name, address, and/or other additional information. Note that each feature will have different form, depending on what tag you choose from the feature panel.
- If you make a mistake, such as a wrong location, you can drag your point to a new location by holding the left mouse button on your point. Or, if you want to delete your point click the left mouse button on the point and then click the button which looks like a trashcan.

A “point” created in the iD editor is actually a standalone “node” with a set of “tags” on it.

Drawing Lines

- To add a new line, click on the **Line** button.

- Your mouse cursor will change into plus (+) sign. Find a road that hasn’t been drawn on the map and trace it. Click once on a point where the road segment begins, move your mouse, and click to add additional points. Double-click to end the drawing process. Notice the panel on the left.



- Just as with a point, select the appropriate tags for your line.
- You can drag points from the line by clicking your left mouse button on a point and dragging it.
- You also can move the whole line by selecting it, and choosing the **Move tool**. Then drag the line to a new position.

- When you click your left mouse button on a point from the line, you will see these tools:
    - Delete point from line
    - Disconnect point from line
    - Split a line into two line from the point you've selected
- When you click your left mouse button on a line, you will see these tools:
    - Delete line
    - Create a circle from a line (only active if the line is closed)
    - Move line

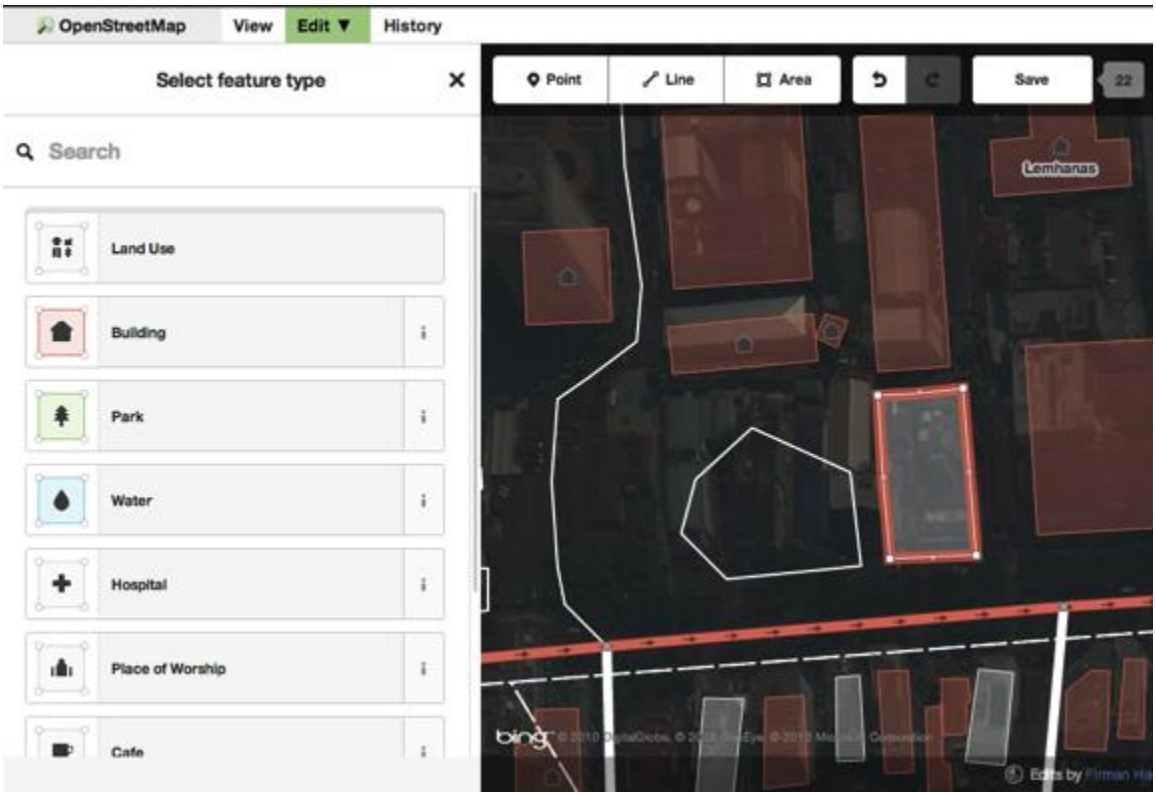
- Form a square shape from a line (only active if the line is closed)
- Reverse line direction

A “line” created in the iD editor is actually a “way” with “tags” on it.

Drawing Shapes (Polygons)

- To add a new shape, click on the **Area** button.

- Your mouse cursor will change into plus (+) sign. Try to trace a building using the imagery as a guide.
- You will notice that the color of your shape will change depending on the attributes that you assign to it.

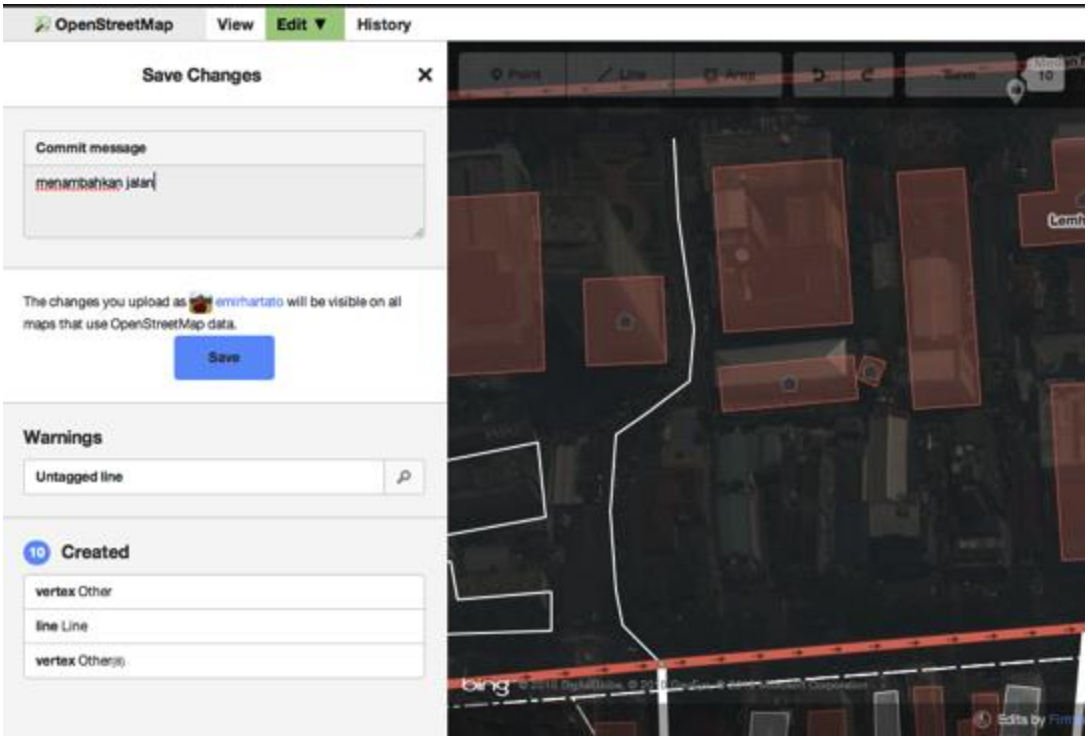


- The tools that are available when you select a shape are similar to those when you click on a line.

A “polygon” in the iD editor is actually a “closed way” with tags on it.

Saving Your Changes

- When (and if) you want to save your edits to OpenStreetMap, click the **Save** button. The panel on the left will show the upload panel.



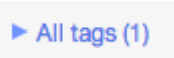
- Enter a comment about your edits and click **Save**.
-

Additional Information and Custom Tags

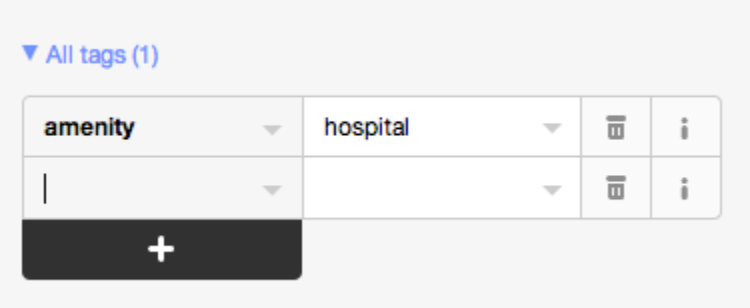
- When you are editing and object, you will see a strip of icons at the bottom of the attribute panel. You can add additional information by clicking these icons:
    - Add elevation
    - Add notes
    - Add contacts / phone number
    - Add source tag
    - Add website

- Add accessibility information
- Add Wikipedia link

- Or, you can add custom tags by clicking **All tags**.



- This will show all the tags attached to the feature.



- Click the plus sign (+) to add keys and values or click the trash icon to delete tags.

ADDING TAGS

In the previous section you learned about OpenStreetMap's geo elements. It is time to learn a little about OpenStreetMap's tagging scheme. The basic tagging scheme can be found in Tagging. The tagging page links to the Map Features page which lists most of the keys accepted by the OSM community. Many of the examples on the Map Features page, particularly those regarding roads, are specific to the U.K. Users in other countries will want to look at Tagging for guidance in applying the tagging scheme to their country.

Types Of Geo objects

OpenStreetMap's Tagging Scheme has 3 data types that may be tagged:

Node: Just a node/point used to mark a particular point on the map. For example:

- A town may be marked using a **node** tagged with place=town.
- A theatre may be marked using a **node** tagged with amenity=theatre.

Linear: A **way** used to mark a particular linear item on the map. For example:

- A motorway may be marked using a **way** tagged with highway=motorway.
- A river may be marked using a **way** tagged with waterway=river.

Area: A closed way to mark a particular area on the map. For example:

- A lake may be marked using an **area** tagged with the natural=water.
- A town may be marked using an **area** tagged as place=town.

2.5 Java OpenStreetMap Editor (JOSM)?

Java OpenStreetMap Editor is a desktop editing application, written in Java. It runs on Windows, Mac OS and Linux. It supports loading standalone GPX tracks and GPX track data from the OSM database as well as loading and editing existing nodes, ways, metadata tags and relations from the OSM database. Interface is a bit bare until some data is loaded.

JOSM welcome page

INSTALLING JOSM

Download the latest JOSM version (josm-tested.jar) from http://josm.openstreetmap.de/ ; or ; http://wiki.openstreetmap.org/wiki/JOSM

There area generally two versions of JOSM available:

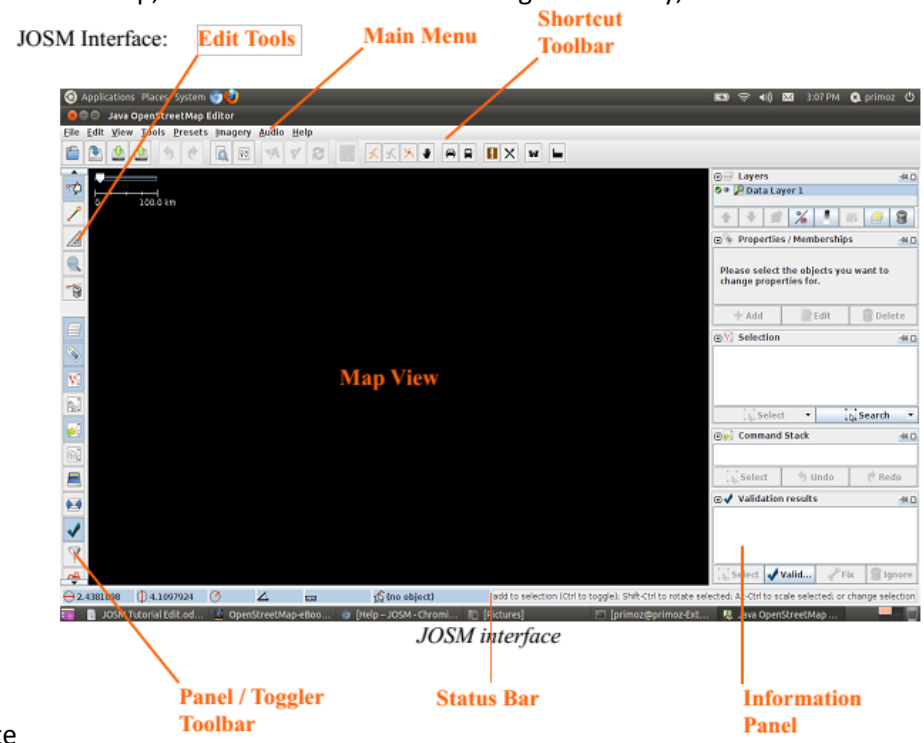
1. tested and
2. latest

The tested version of JOSM is more stable while the latest is more up-to-date but can contain bugs. There are fairly regular updates to JOSM, so always try running a recent version (and also recent plugins).

JOSM version is distributable as executable JAR file which can usually be run just by double clicking if Java is correctly installed. You are ready to go!

JOSM USER INTERFACE

Run JOSM by double clicking the JAR file. Once JOSM is successfully launched the main window appears. At startup, the window shows the Massage of the Day, downloaded from the JOSM website



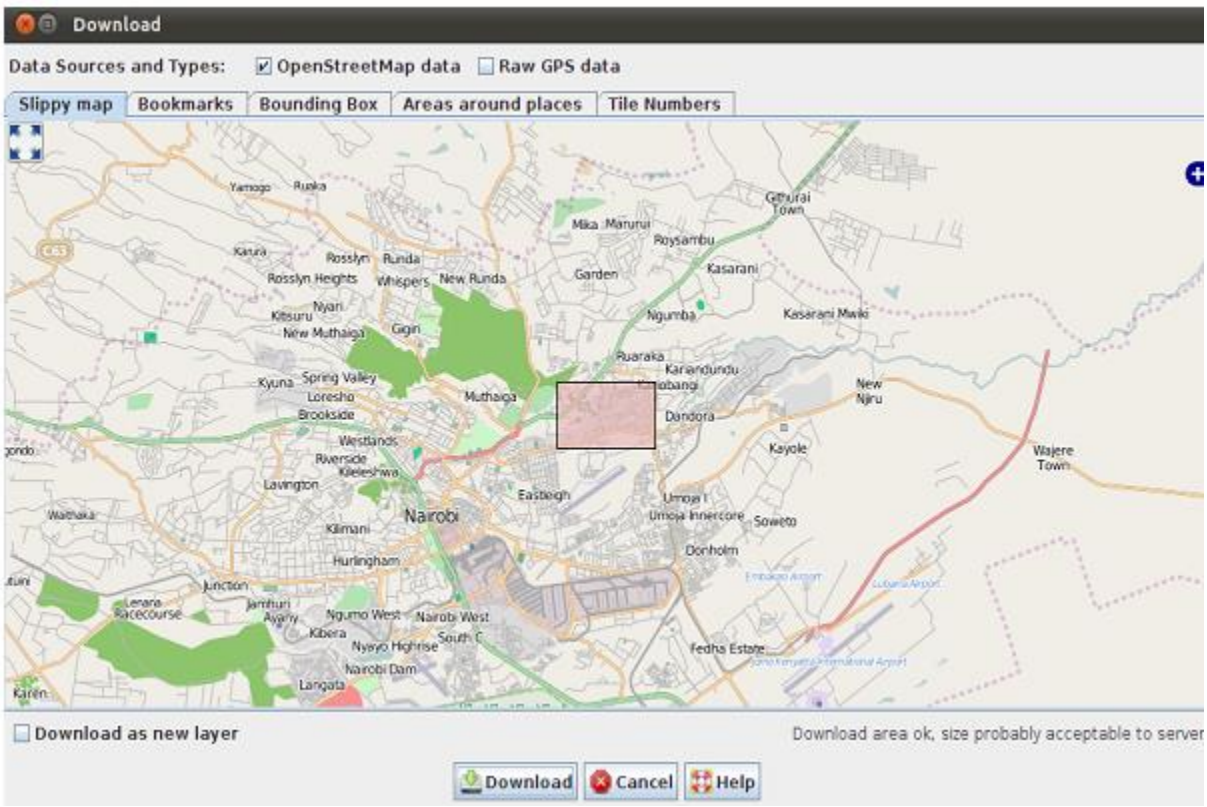
JOSM interface

Map View– The main window where the geodata is displayed and editing takes place.
Main Menu– The menu is customizable depending on which plugins you have installed.
Shortcut Toolbar– The buttons in this toolbar are shortcuts to commands from the Main Menu. This toolbar is highly customizable, with the ability to add and remove menus items from the preference dialog.
Edit Tools – Contains drawing tools and the show/hide buttons for the Toggle Dialogs window.
Information Panels – These show information about the data in JOSM, including a list of selected objects, how the elected objects are tagged, who the last mapper to edit a feature was, and the different layers in the view.
Status Bar –Gives coordinates and measurements for features, as well as a hint of the current tools function.

DOWNLOAD DATA FROM OSM

To download map data from the OSM server:

- Press File> Download from OSM...or the icon on the Main Toolbar or press Crtl+Shift+D . The download dialog box appears:

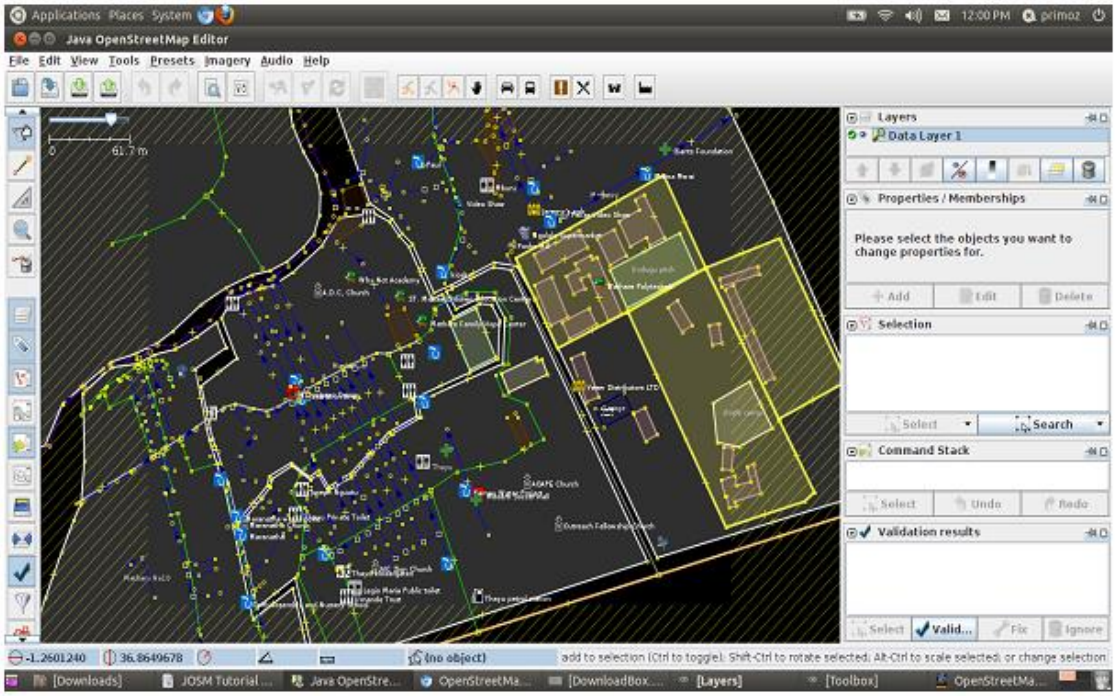


Slippy map

Initially the 'slippy map' tab is selected. Slippy map provides a movable map like on the OSM front page with which you can interactively select the area to download. Move or “Slip” around the map by dragging the right mouse button. Zoom by using the mouse scroll-wheel or by double-clicking.

Download data:

- Download dialog box
- Use the left mouse button to drag a box around the area you want to download (this is the bounding box that will be downloaded) > press Download
- Data should appear in the main Map View Window



You should download the area encompassing the area you will be editing but avoid downloading too much map data. You can always download more data as you need it. “Cross hatching” will be shown outside the area that you downloaded to remind you that you should not edit outside the area that you download from the server. The items outside the bounding box are included because they are included inside the bounding box.

There are other ways to specify the area you want to download:

Bookmarks

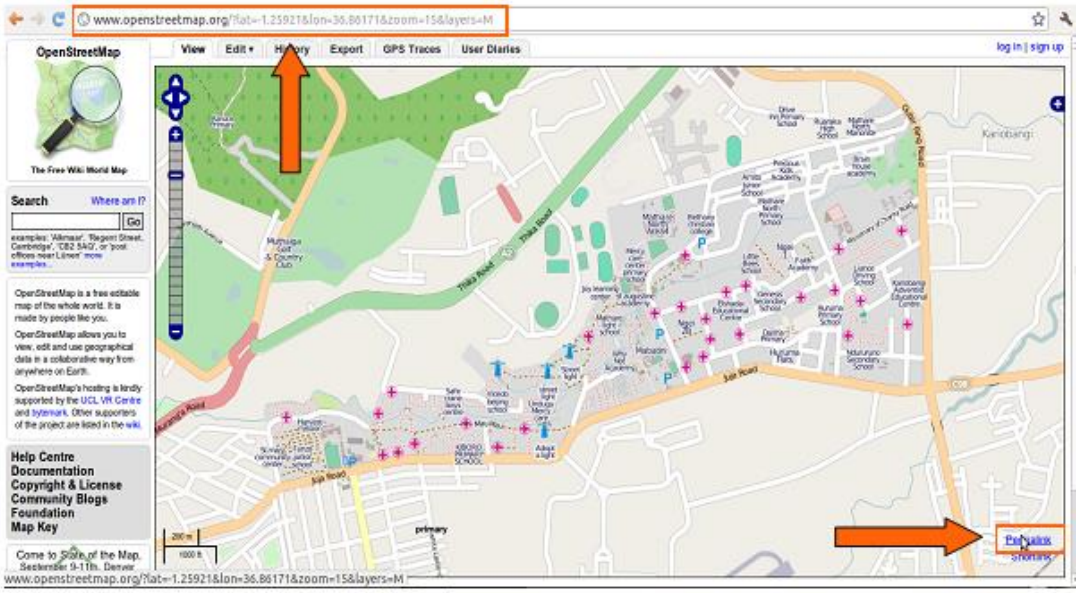
- You can select from your predefined bookmarks or create a new bookmark from your current bounding box or an area defined in another tab respectively.

Bounding Box

- Select an area by entering the latitudes and longitudes directly or by extracting them from an *openstreetmap.org* URL.

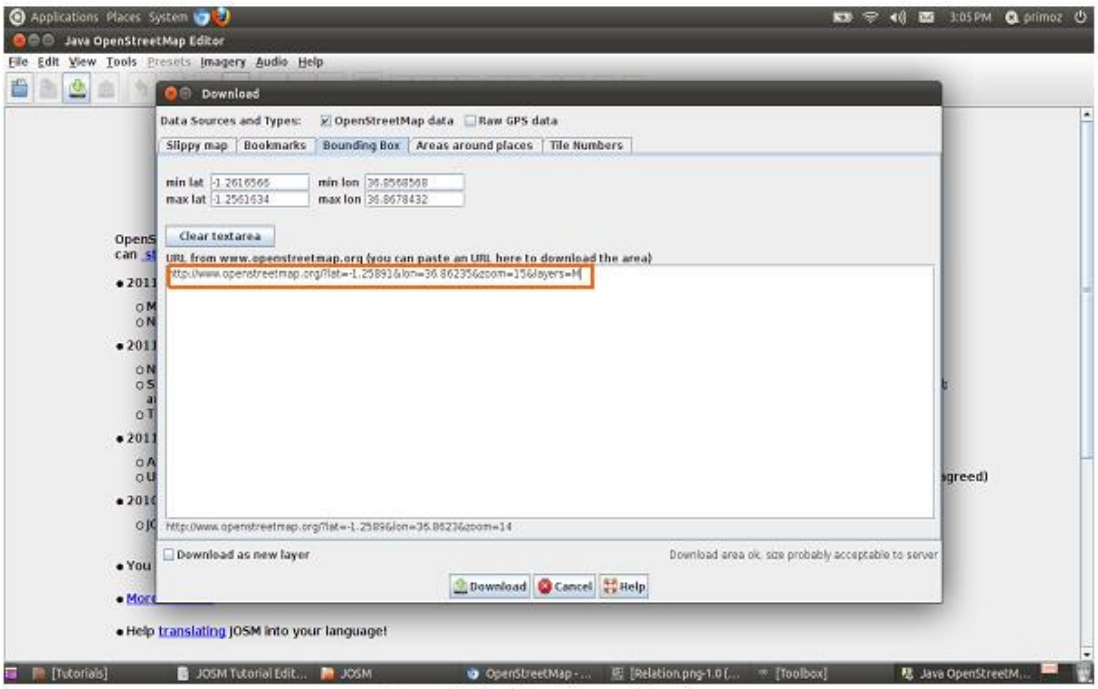
Download data by pasting from the map on the OpenStreetMap site:

- Zoom into the area you are interested in
- Move the mouse over the “view” tab and copy the resulting URL or copy the Permalink given
- at the bottom right corner
- Copy the URL
- Paste the URL into JOSM, into the “URL from openstreetmap.org” box



URL from openstreetmap.org

Copy the URL into the Download Bounding Box tab:



Copy URL into Bounding Box

- Copy URL into Bounding Box
- Areas around places
- Search for specific places, street names, etc., in the OSM database.
- Tile Numbers
- Enter number of tiles and a zoom level to download data of those tiles.

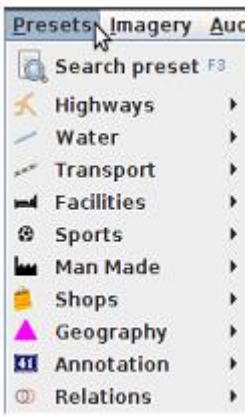
WHAT ARE PRESETS?

A preset is a predefined combination of tags (sometimes a single tag) that is given a “human-readable”
name.

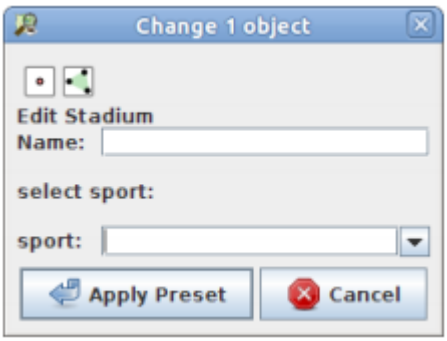
The presets menu contains a list of presets organized in thematic groups. Presets allow the user to tag objects by selecting them from the predefined menu. JOSM installation comes with a default set of these presets.

FIND PRESETS:

In JOSM go to Main Menuand press Presets

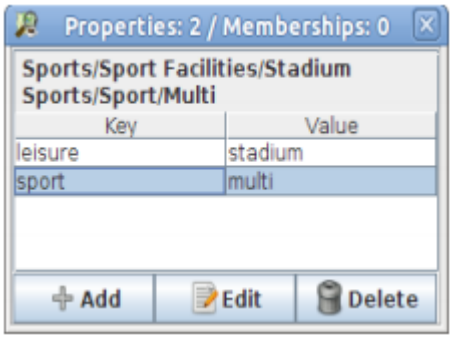


When applying a preset to an element of the map, a dialog window may appear allowing the user to enter more precise and/or specific data. For example, the preset “Sports/Sport facilities/Stadium” will apply the tag leisure = stadium and will ask the user to enter the value for the optional keys name and sport. A list of common sports is suggested.



Applying the preset "Stadium" to a node

If a tag is included in a preset, an additional line will be displayed in the “Properties/Membership” panel, above the list of tags as shown below. Clicking on this line will open the preset dialog box shown above.



PRESET PROPERTIES

The users can create, add, modify and use their own presets, for example in specialized use cases like event mapping etc. (more on this in Advanced Editing).

Add a tag

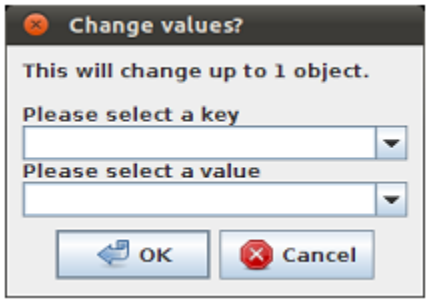
Add a new tag by using an **'Add A Tag'** button:

- Press the button Add a Tag

- Change values window appears where you can select a key or a value from the drop-down list. The drop-down list contains all the values in the downloaded area and all the know tags or presets.

Add a tag by using predefined Presets:

- Select a tag from Presets by pressing Presets tab on the Main Menu
- Select a tag from the drop-down
- Select the attributes
- Press Apply Preset

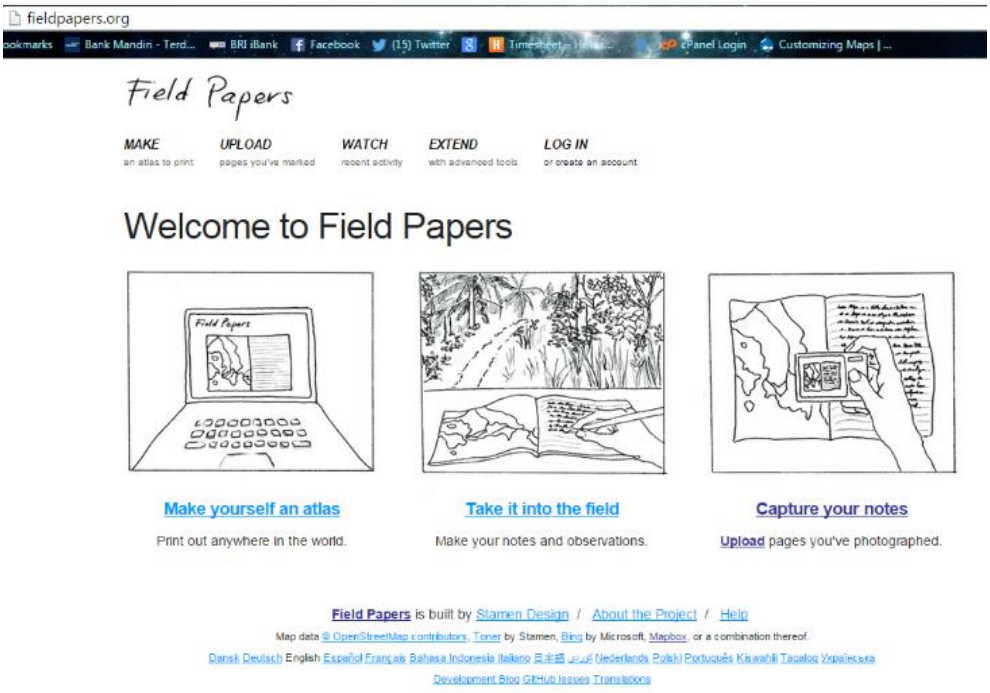


2.6 FIELD PAPERS

Field Papers, which was created by Stamen Design and is the update of a tool called Walking Papers, allows us to print a map of a selected area, draw on it, add notes to it, and then open it in an OpenStreetMap editor like iD to digitize the drawing.

Create and Print Field Papers

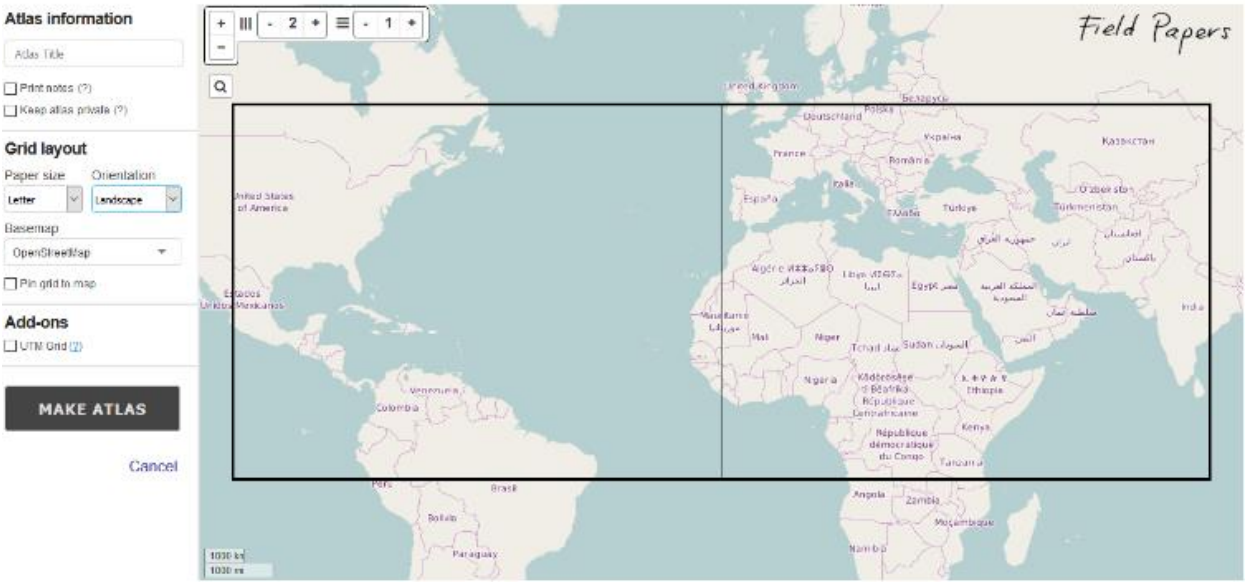
1. Open your web browser. In the address bar at the top of the window, enter http://fieldpapers.org/ and press **Enter**
2. The website should look something like the figure below:



Interface Field Papers

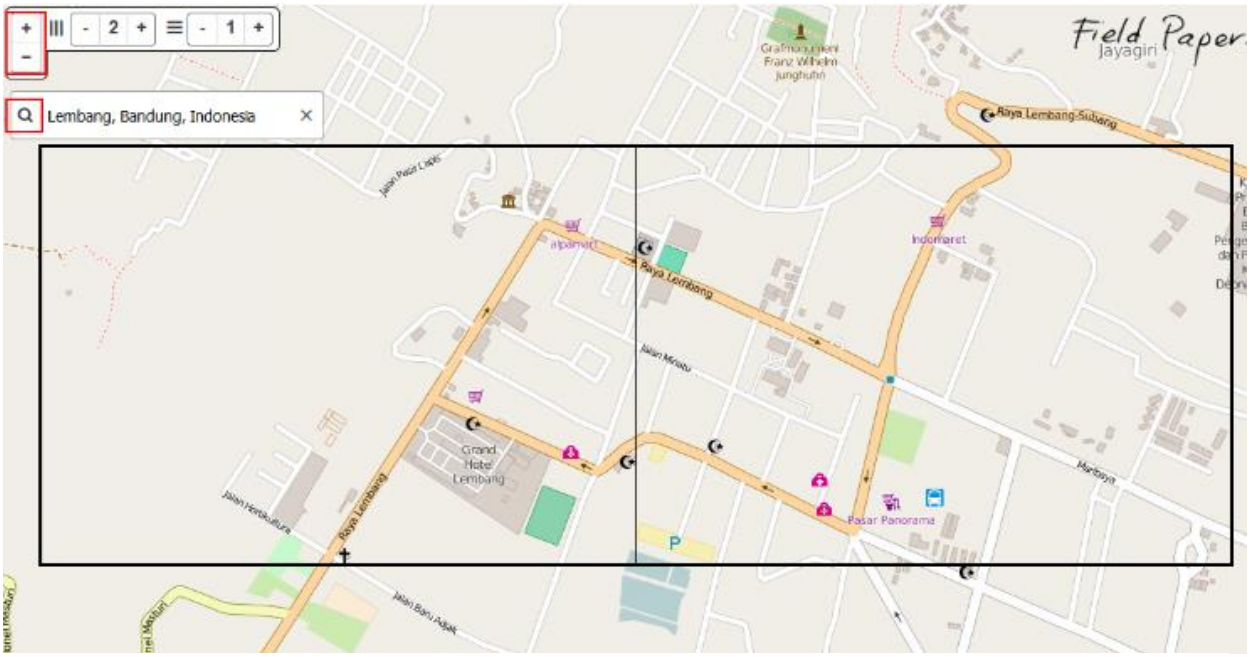
3. Click ***Make yourself an Atlas*** to select the area that you want print out.

4. You will be directed to a page like this where you can see there are some setting at left panel and main map at the right.



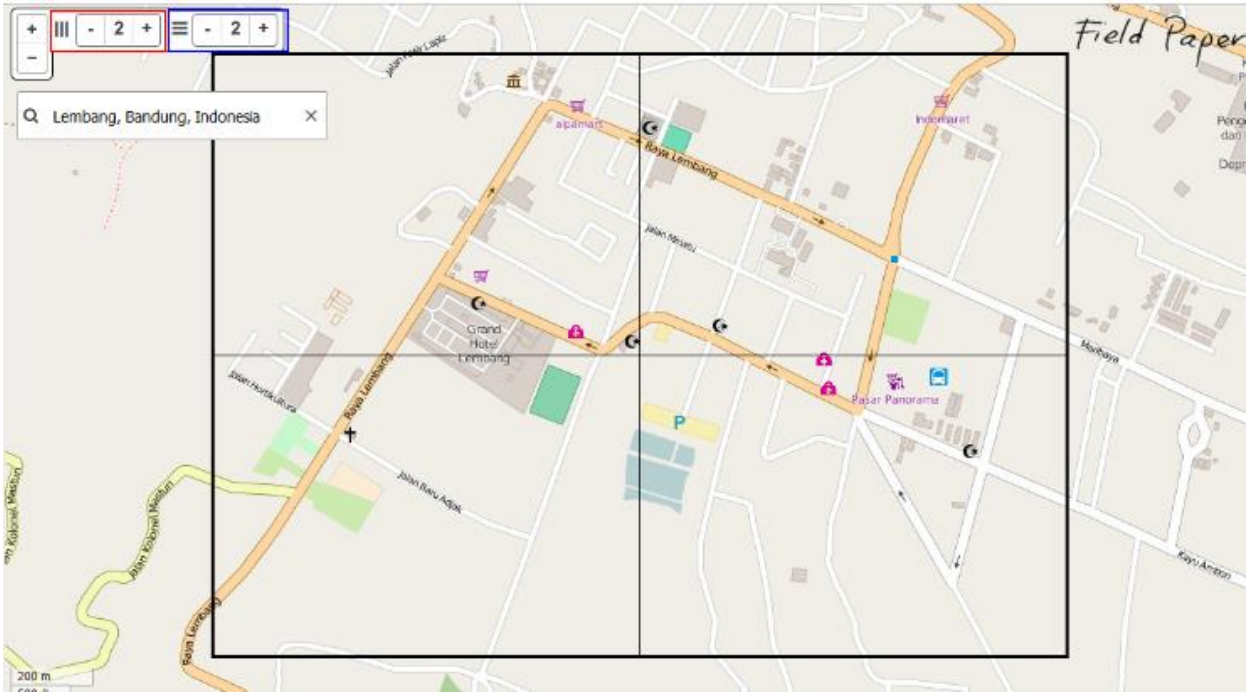
Compose Field Papers

5. On the main map, to find the area that you want to map, you can click search button and type the location name OR you can drag manually the map with the same way when you drag map in OpenStreetMap website, use the left button your mouse for drag map, and scroll your mouse for zoom in and zoom out. Click on + and - buttons in the upper left corner for zoom in and zoom out.



Setting the area in Field Papers

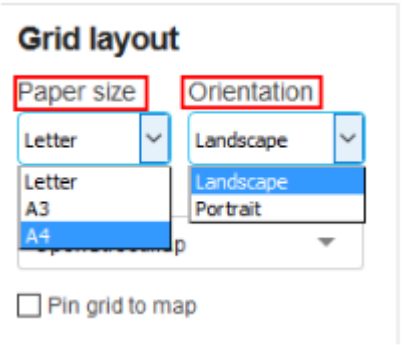
Here you also can define the boundaries of your Field Papers. The boundaries is displayed as hollow box with black border. You want to make sure that the window displays the area of interest that you intend to map. You can add more page or less page. Make sure that your map can display building and road for field survey.



Setting the page in Field Papers

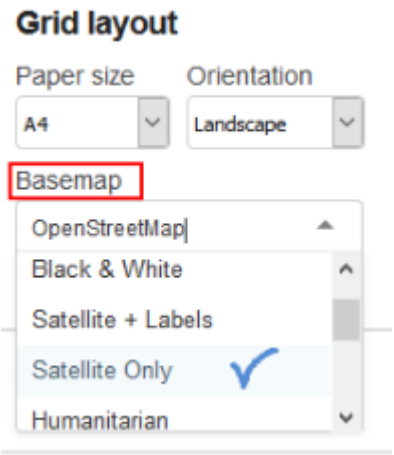
6. At the left panel are some setting for print out Field Papers. The first is give information to your atlas by type a name on the **Atlas Title** column.

7. The second is the Grid Layout setting. The **Paper Size** is used to adjust the paper size that you want use for printing out Field Paper. You can choose ***letter***, ***A3***, or ***A4***. Then the **Orientation** is used to adjust the paper orientation that you want use for print out Field Paper. You can choose between ***portrait*** or ***landscape*** as shown in the figure below.



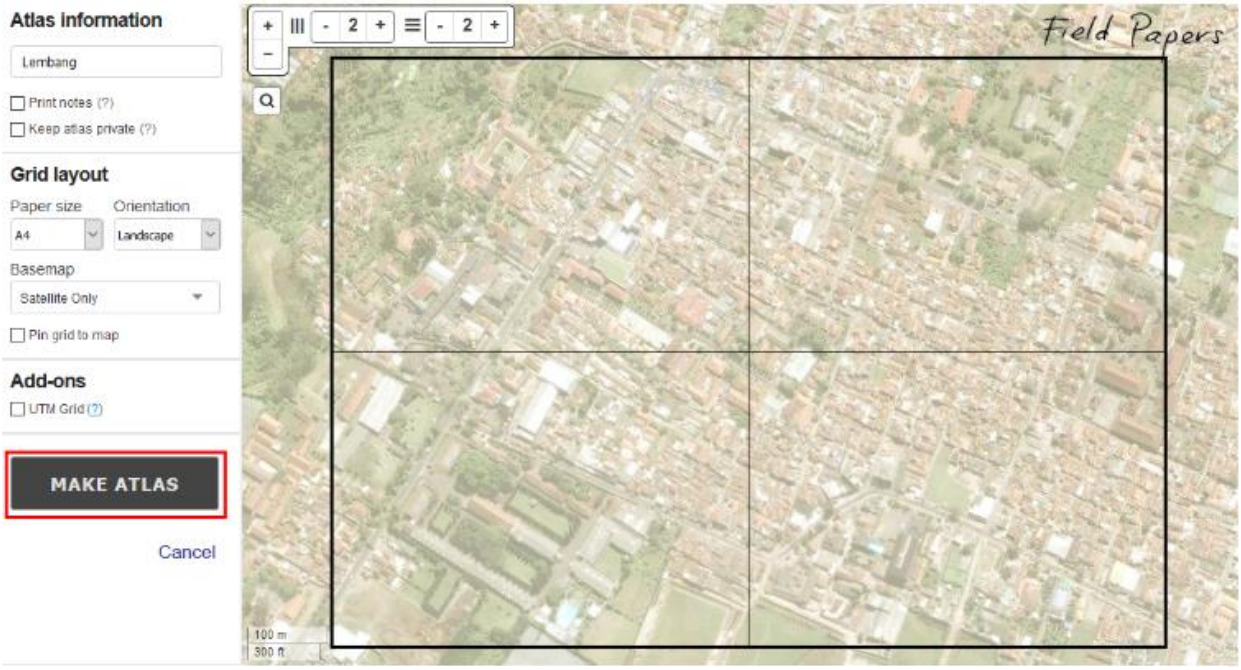
Setting the paper size and paper orientation in Field Papers

8. Still in Grid Layout setting, next you can select the type data for your Field Papers. You can select different **Basemap** for change map background. In this example shown in the figure below, we will select ***Satellite Only***.



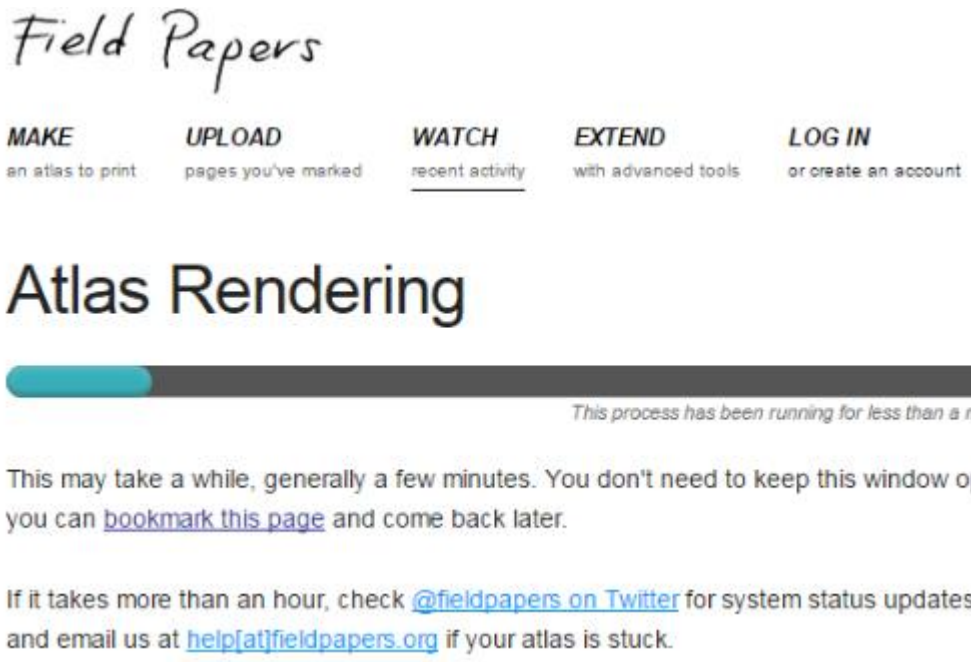
Setting Map Background on Field Papers

9. When you're finished, click ***MAKE ATLAS***



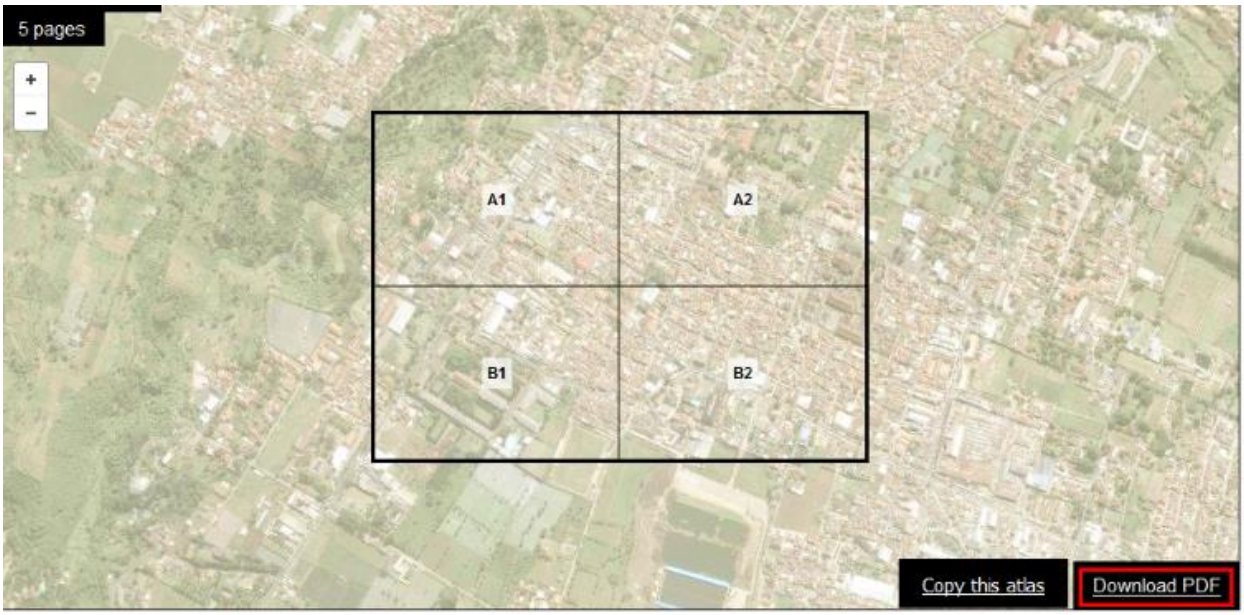
Next step to create Field Papers

10. It may take a few minutes to prepare your final Field Papers map. When finished, you will see your Field Paper on this page, shown in the figure below.



The process preparing Field Papers

11. When your print is ready, Click ***Download PDF***. The Field Paper should begin downloading. If it loads in your browser, you may need to save it by going to ***File ▸ Save***.

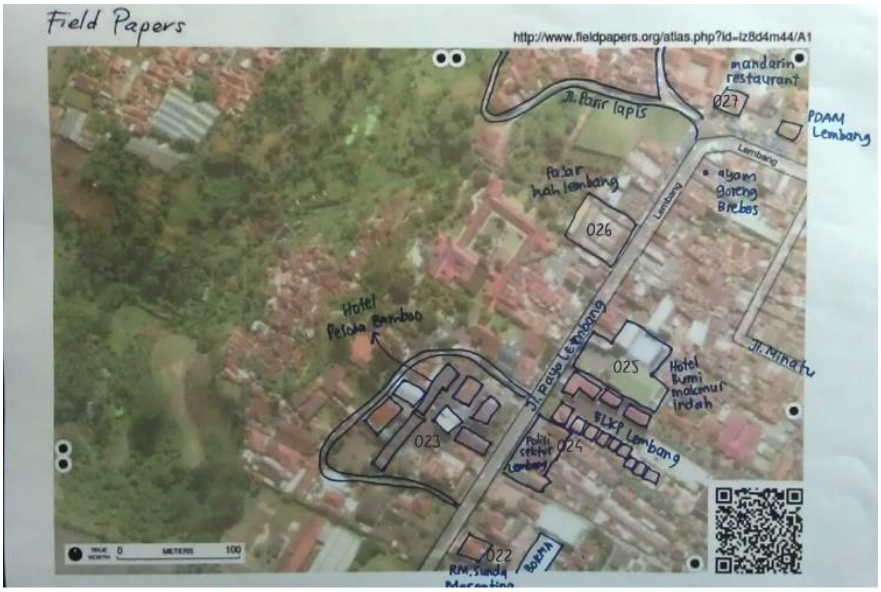


Download Field Papers

When the download is finished, open the PDF file. Connect your computer to a printer and print the page. If everything goes well, you should now have map printed on paper.

Scan and Upload Field Papers

1. Field Papers are very useful for mapping with nothing more than paper, but they are not a 100% solution. We will still need to load our paper map into JOSM, add our information digitally, and save our changes on OpenStreetMap.
2. The first step is to scan your Field Papers into your computer. You can do this by attaching a scanner to your computer, scanning the paper, and saving it as an image file. If you don't have a scanner, you can take a photography of the paper, but you should be careful to take a very good photo. Make sure that the paper is flat and your camera is directly in front of it. Be sure to include the barcode in the image, as Field Papers will not work without it. Here is an example of a scanned/photographed image:

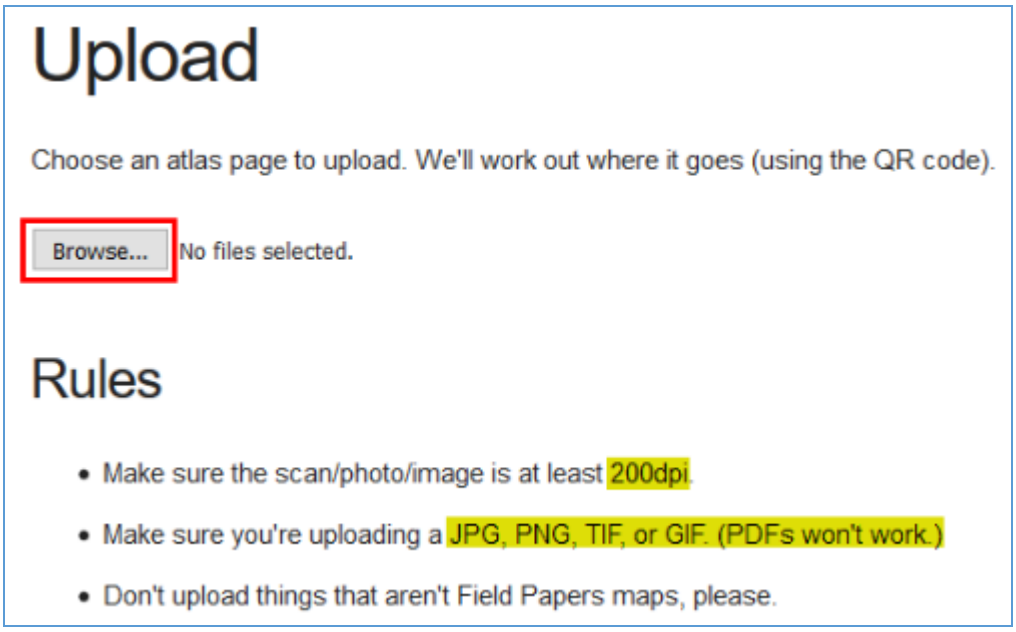


Field Papers Image

3. Once you have your Field papers scanned and saved on the computer, open your web browser and return to Field Papers website just as before.
4. Click the **Upload** tab at the top of the page.

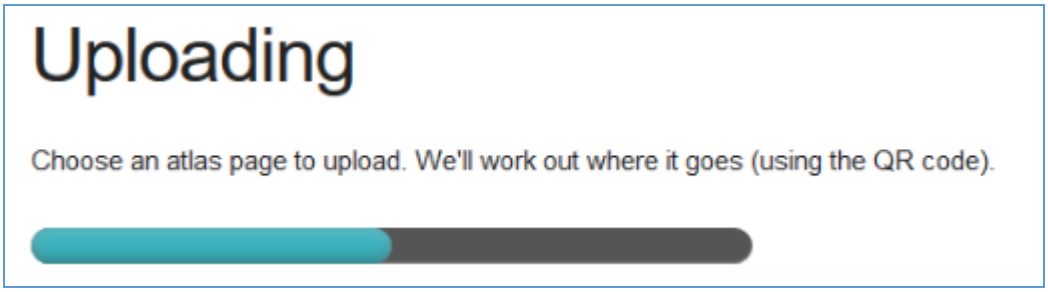
Upload Field Papers

5. Click **Browse...** and navigate to the file where you scanned/photographed your Field Papers.



Select the to be uploaded to Field Papers website

6. It may take a few minutes for your paper to upload, depending on the speed of your connection.



Field Papers uploading process

7. When the upload finished, you can see the page interface as in the figure below:

The result from upload Field Papers

Add Plugin Field Papers

Before we open Field Papers in JOSM, we need install the Field Papers plugin. The fieldpapers plugin enables JOSM to open Field Papers that have been uploaded to the Field Papers website. The Field Papers will be used as background, and we open it using the same procedure for opening satellite imagery in JOSM.

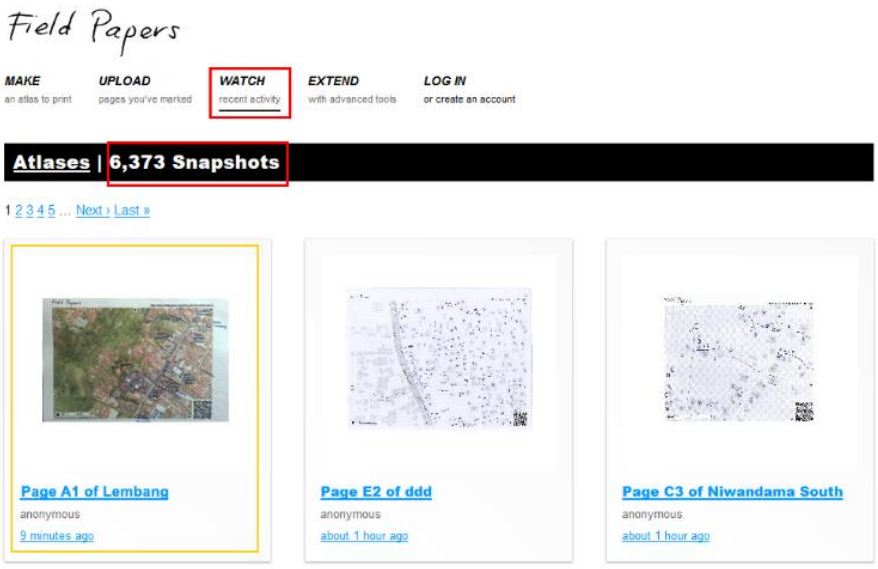
1. Open JOSM and go to ***Edit ▸ Preferences***.
2. Click on ***Plugins*** tab.
3. Type **fieldpapers** in the ***Search*** box. After you find it, tick the fieldpapers box and Click ***OK*** as shown in the figure below.

Field Papers Plugin

4. Restart JOSM so the plugin loads.

Open Field Papers from ID and JOSM

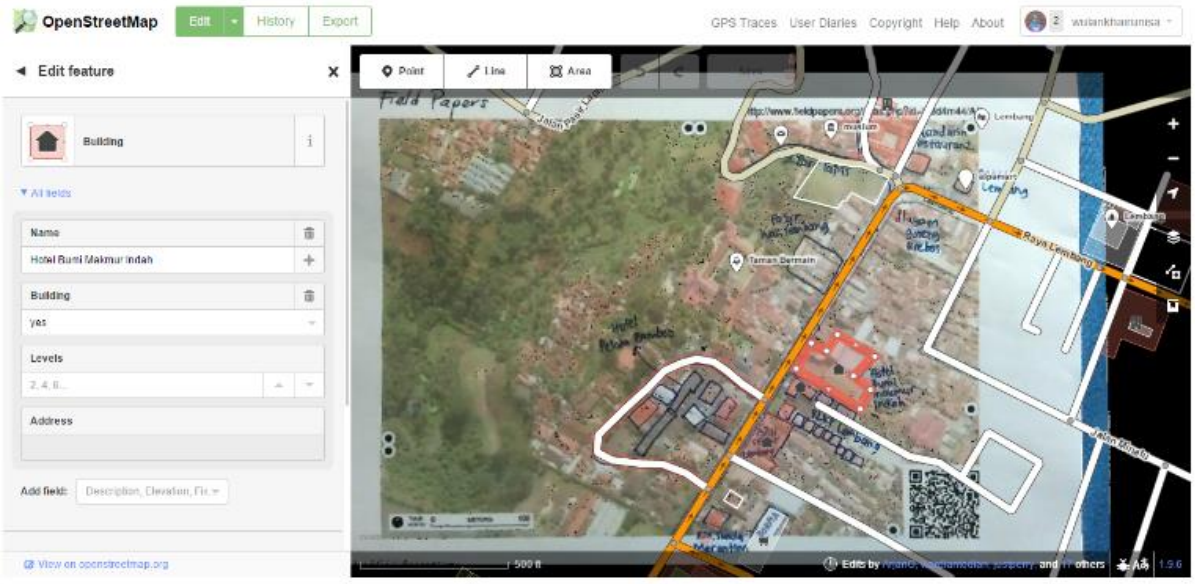
1. Now you can add the results of your scanned Field Papers to ID or JOSM and add your information to OpenStreetMap. Return to the Field Papers website in browser address bar.
2. Click ***Watch*** – move your mouse to the bottom and click ***Snapshots*** until your browser page looks like the figure below:



List Field Papers in Snapshots

To use scanned Field Papers in the online ID Editor or Potlatch2 by clicking the link ***Edit in... ID*** or ***Edit in... Potlatch*** on page Field Papers that have been scanned.

Editing Field Papers with iD Editor



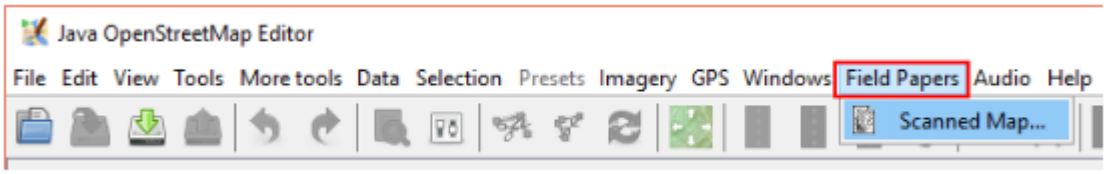
Interface Editing OSM data on iD Editor

3. To open Field Papers in JOSM, we need copy the photo ID from the Field Papers that have been scanned. We can get the ID from the snapshot URL at the Field Papers website. Click on the

image until the url appears as shown below, then copy the URL for example: *http://fieldpapers.org/snapshots/cdq5bfq4#17/-6.81299/107.61451*

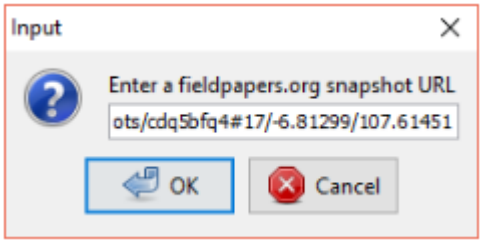
URL from Snapshot Field Papers

4. Copy the URL by selecting it and pressing `CTRL + C`.
5. Open JOSM and make sure the Field Papers plugin is listed in the menu on the top of toolbar. Click ***Field Papers ▸ Scanned Map...***



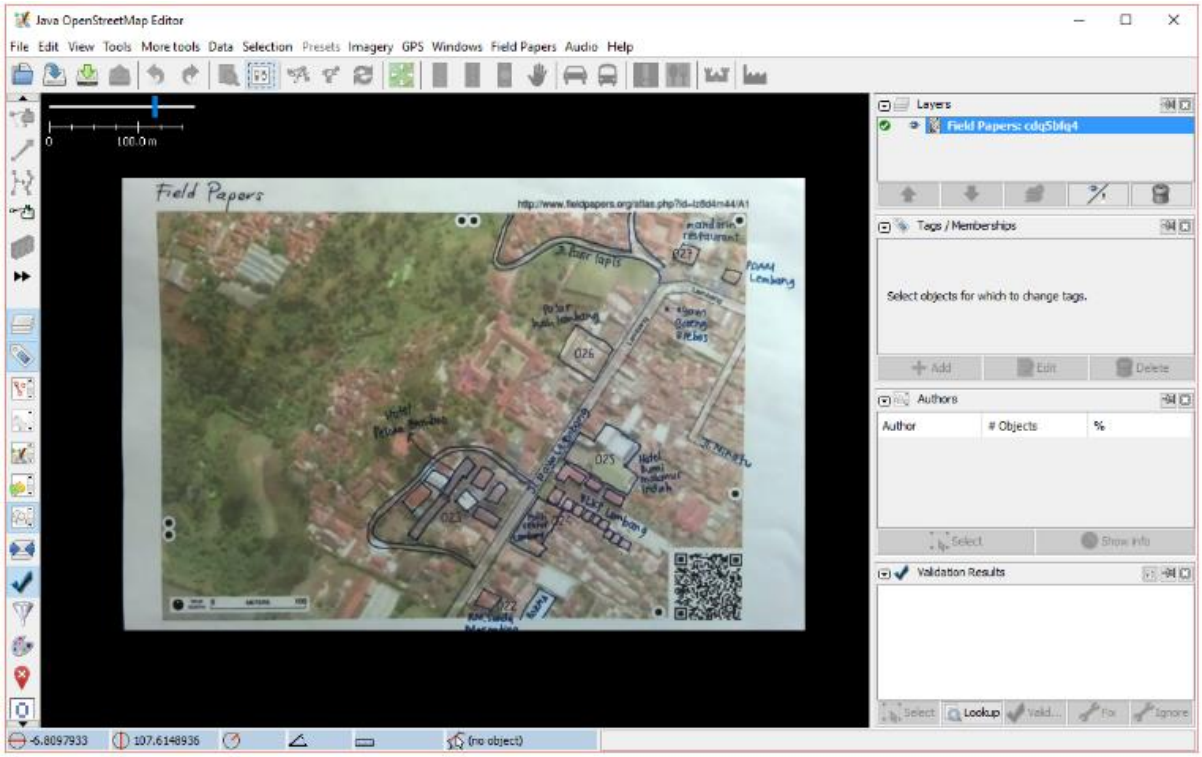
Field Papers Menu in JOSM

6. Then paste the URL that we have copied from the Field Papers site by pressing `Ctrl + V` on your keyboard.



Input Field Papers URL in JOSM

7. Click ***OK***.
8. If everything goes well, the Field Papers will open in JOSM. The next module, we can see how to add objects from the scanned Field Papers to OpenStreetMap.



Interface Field Papers in JOSM

Exercise!

After you add your changes to OSM, they will be saved to the OSM servers. When you want add some information to your map, you can print a Field Paper that includes the changes you made. As this process is repeated, and you acquire more details, the map will steadily improve!

Summary

In this module, You have learned how to use Field Papers and how Field Papers works as a data collection device. You have learned how to print, mapping, and scans Field Paper, and how you can use them to improve OpenStreetMap.

3. Loading and Integrating Different Formats of data with QGIS

3.1 GPS to QGIS

There are dozens of different file formats for storing GPS data. The format that QGIS uses is called GPX (GPS eXchange format), which is a standard interchange format that can contain any number of waypoints, routes and tracks in the same file.

To load a GPX file you first need to load the plugin. ***Plugins*** ***Plugin Manager...*** opens the Plugin

Manager Dialog. Activate the ***GPS Tools*** checkbox. When this plugin is loaded two buttons with asmall handheld GPS device will show up in the toolbar:

Create new GPX Layer

GPS Tools

For working with GPS data we provide an example GPX file using which the following steps have to be performed-

1. Select ***Vector*** ***GPS*** ***GPS Tools*** or click the GPS Tools icon in the toolbar and open the***LoadGPX file*** tab (seefigure_GPS_1)**.**
2. Browse to the folder qgis_sample_data/gps/, select the GPX file national_monuments.gpxand click **[Open]**.

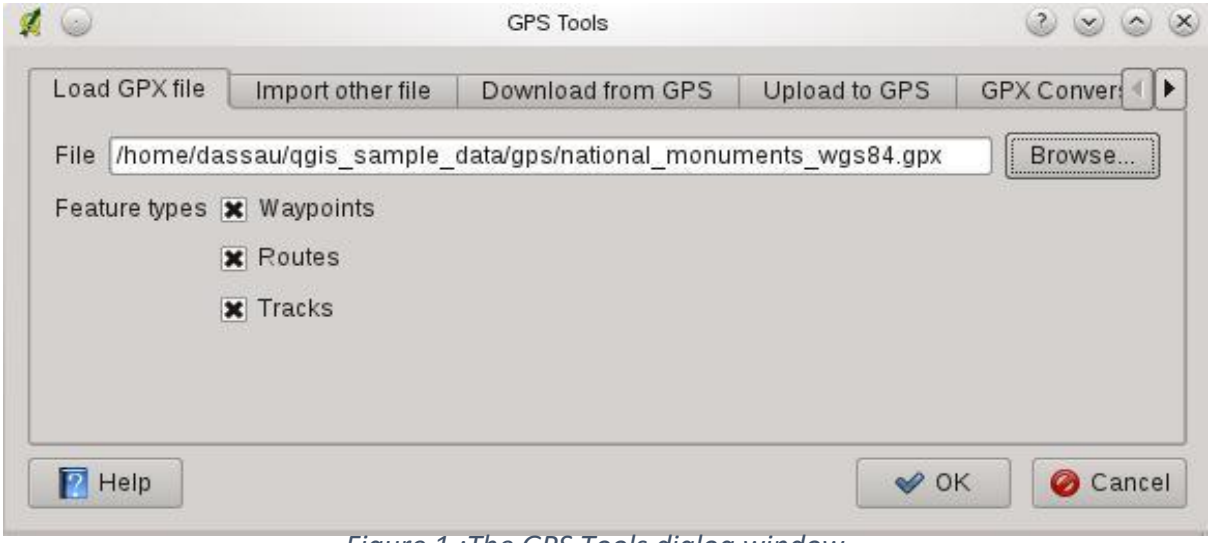


Figure 1.:The GPS Tools dialog window

Use the **[Browse...]** button to select the GPX file, then use the checkboxes to select the feature types you want to load from that GPX file. Each feature type will be loaded in a separate layer when you click **[OK]**. The file national_monuments.gpx only includes waypoints.

Note

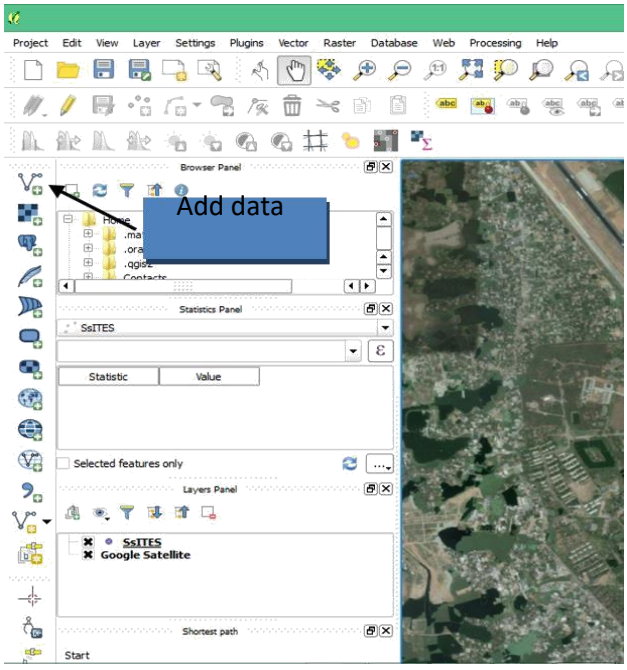
GPS units allow to store data in different coordinate systems. When downloading a GPX file (from your GPS unit or a web site) and then loading it in QGIS, be sure that the data stored in the GPX file uses WGS84 (latitude/longitude). QGIS expects this and it is the official GPX specification.

Importing GPS data

To import GPS data from a file that is not a GPX file, you use the tool ***Import other file*** in the GPS Tools dialog. Here you select the file that you want to import (and the file type), which feature type you want to import from it, where you want to store the converted GPX file and what the name of the new layer should be. Note that not all GPS data formats will support all three feature types, so for many formats you will only be able to choose between one or two types.

3.2 Loading Vector data (shapefile)

Click the **Add Vector Layer** button to add geospatial data (Figure 2), which opens a window (Figure 3)



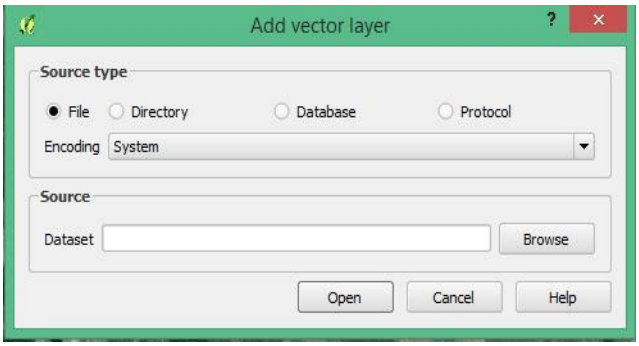


Figure 2. A. ***The Main Window : Add Vector Layer button***

Figure 3.B. The Pop-up Window to "Add Vector Layer"

Then you can browse to the file you want to work with by clicking the **Browse** button just like any other file explorer dialogs in Windows. You can open multiple files at one time by holding the **Ctrl** or **Shift** button when you are clicking the mouse button to make selections. The by-default file filter is *.shp file (Figure 4). But there are many other choices, such as *.kml (Google Earth) and *.csv, much broader than ArcGIS.

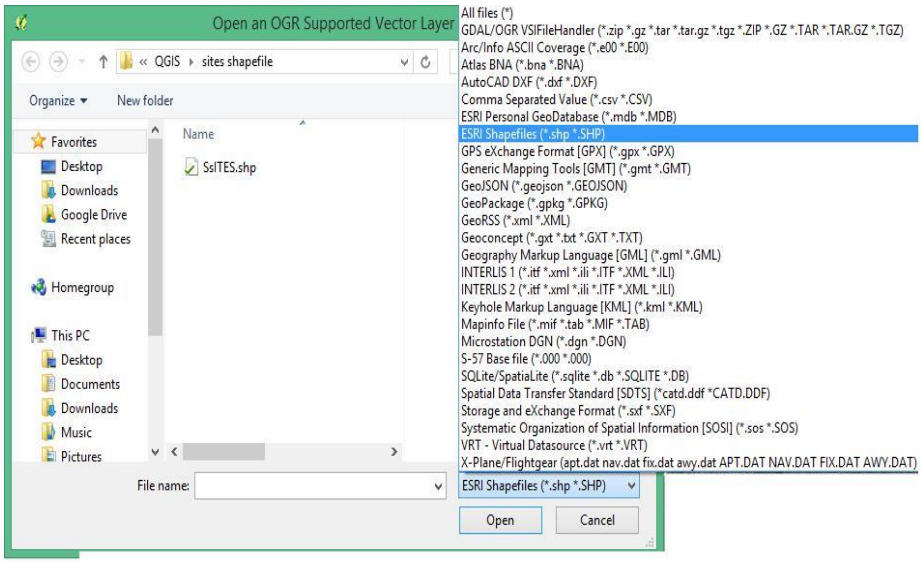


Figure 3. ***The File Open Dialog with File Filters***

For example, you can browse Khulna_Div.shp file from pov_khl folder that was provided in Practice Data folder as your sample dataset.

3.3 Load Google Maps ,Bing Maps and Openstreet Maps:

QGIS provides the flexibility of using Google (or Yahoo) Satellite images or Bing aerial images as a background layer in your map. To do so, follow the steps below:

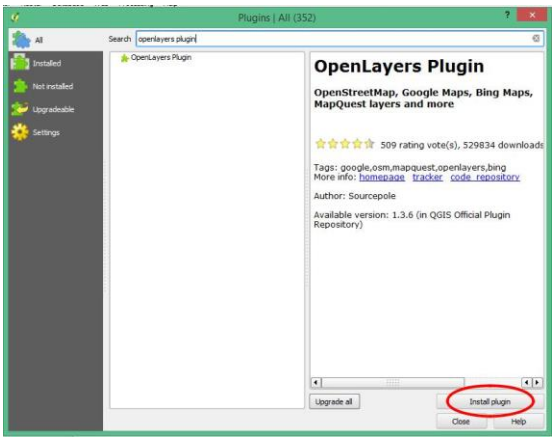
1. Install the OpenLayers Plugin into QGIS:

a. Go to **Plugins -> Manage and Install Plugins**, which leads to a dialog.

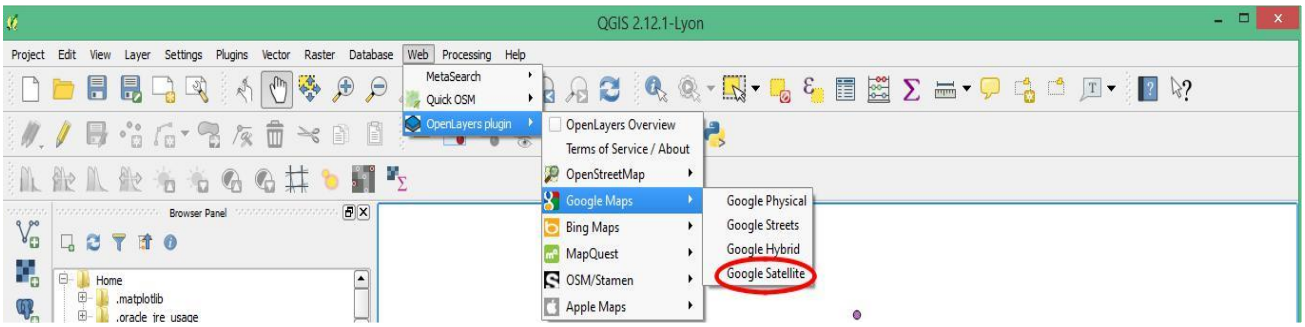
b. Type **'Openlayers Plugin'** in the search box

c. Click on **'Install plugin'** and the **'Openlayers Plugin'** will be installed in your QGIS.

2. Add Google Satellite map as Background layer:



Go to the menu **Web** ->**Openlayers plugin** ->**Add Google Satellite Map.**



3. Add Bing Aerial Map as Background layer:

   Go to the menu **Web** ->**Openlayers plugin** -> **Bing maps-> Bing aerial.**

4. Add Openstreet Map as Background layer:

   Go to the menu **Web** ->**Openlayers plugin** ->**OpenstreetMap->OpenStreetMap**

3.4 Loading CSV File from excel and Modification of attribute table

A **CSV** is a comma separated values file, which allows data to be saved in a table structured format. CSV can be converted from an excel file and it is more necessary when we are using the date in QGIS. QGIS directly supports CSV file rather than an excel file. So, if you have an excel data to join, you must convert it into CSV file and then load into QGIS.

Conversion to CSV

- Open the Excel file in Microsoft Office Excel and save it as a anew file
- Click on File>**Save As**> Select **CSV** as **Save as type> Save**

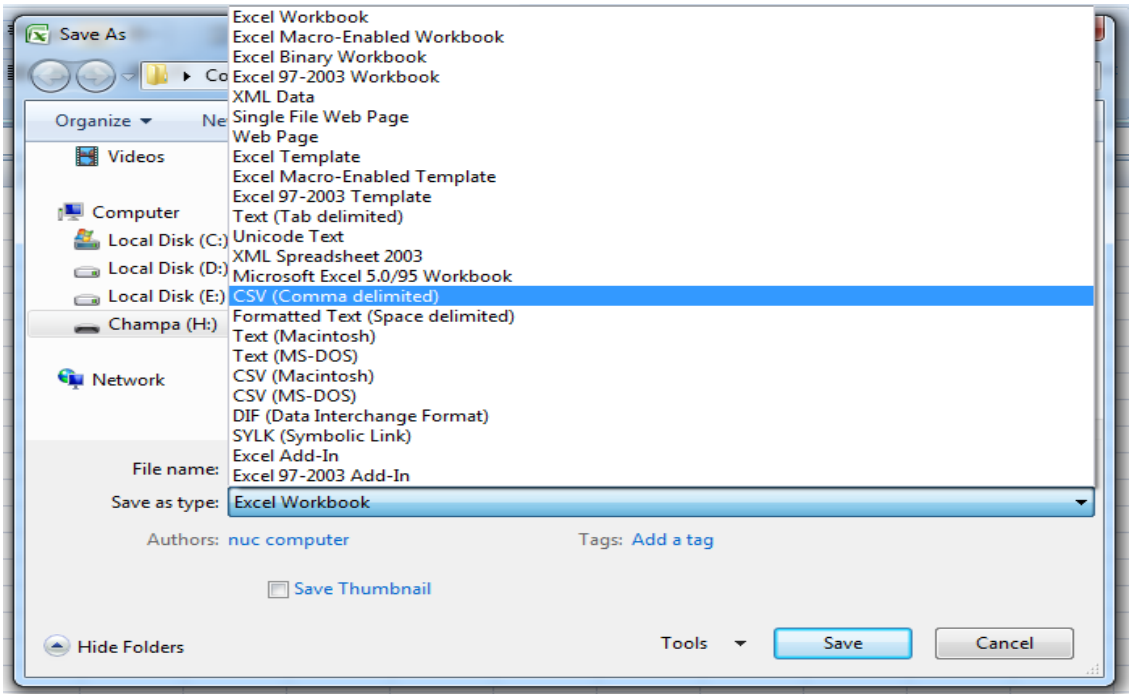


Figure 4. ***Pop-up window of Excel Save as type option***

3.5 Loading CSV in QGIS

Now, the excel file has been converted into a CSV file and will be loaded into QGIS. Click on **Layer** on menubar>**Add Layer**>**Add Delimited Text Layer.** The point to be noted that there are two types of tabular data: one contains geographic data (x, y coordinates) and another contains descriptive data having in details information.

4. Map/Print Composer

When the geospatial data and its representations are satisfactory, you can add other map components in another window via Project-> New Print Composer (Figure 31). You can manage multiple composers via **File - > Composer** Title box will pop up. Entering the Title a new window will pop up.

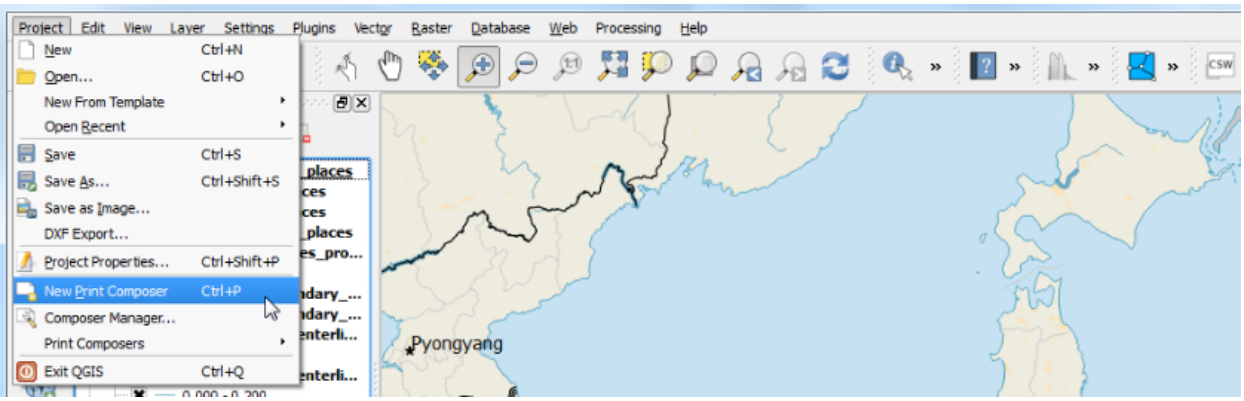


*Figure 5. **New Print Composer in Project menu***

Key components of publishing a map include:

- The title of the map;
- The scale of the map;
- The North Arrow (Orientation);
- The Legend (how to interpret the map);
- (Optional) The reference (where you obtain the data)
- Date of preparation and map preparing authority

The main part, map, can be added by clicking in **Layout>Add Map**, and then drag a rectangle on the paper to define display area and extent.

Map titles can be added as a text box by clicking and then click on the spot where you want to place the title at. Please note that, in print composer, you can customize the properties of all components by switching to the ITEM tab. So, for instance, if you want to change the font of the title, click the title first (so that it is selected) and change to the ITEM tab. There is a button called Font where you can find all properties there.

Add scale bar is also intuitive: click on and then click where you want to add it. You can change Unit label and Style. The scale bar style can be numeric, i.e. 1:5,000,000, or different bar/line forms. All options are intuitive and can be tested by changing it back and forth.

North Arrow can be added as an arrow. The options of a north arrow in QGIS are very limited. Legend can be added in the same way as others (click on).

QGIS has better organization of legend properties than ArcMap. The major options are located under Legend items. You can fine tune in Item Options.

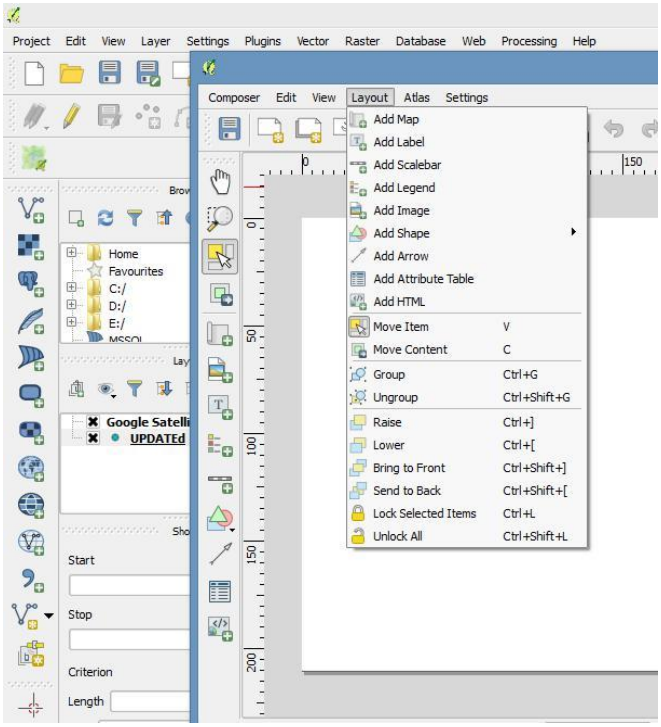


*Figure 6. **Map Composer***

Now we can start to assemble our map.

- **Go to Project ▸ New Print Composer.**
- You will be prompted to enter a title for the composer. You can leave it empty and click Ok.

Note

Leaving the composer name empty will assign a default name such as Composer 1.

In the Print Composer window, click on Zoom full to display the full extent of the Layout. Now we would have to bring the map view that we see in the QGIS Canvas to the composer. You can add the items by choosing from **Layer** tab or the **Layer Pane**l at left of the canvas (Figure 33).

- Go to Layout ▸ Add Map
- Once the Add Map button is active, hold the left mouse button and drag a rectangle where you want to insert the map.

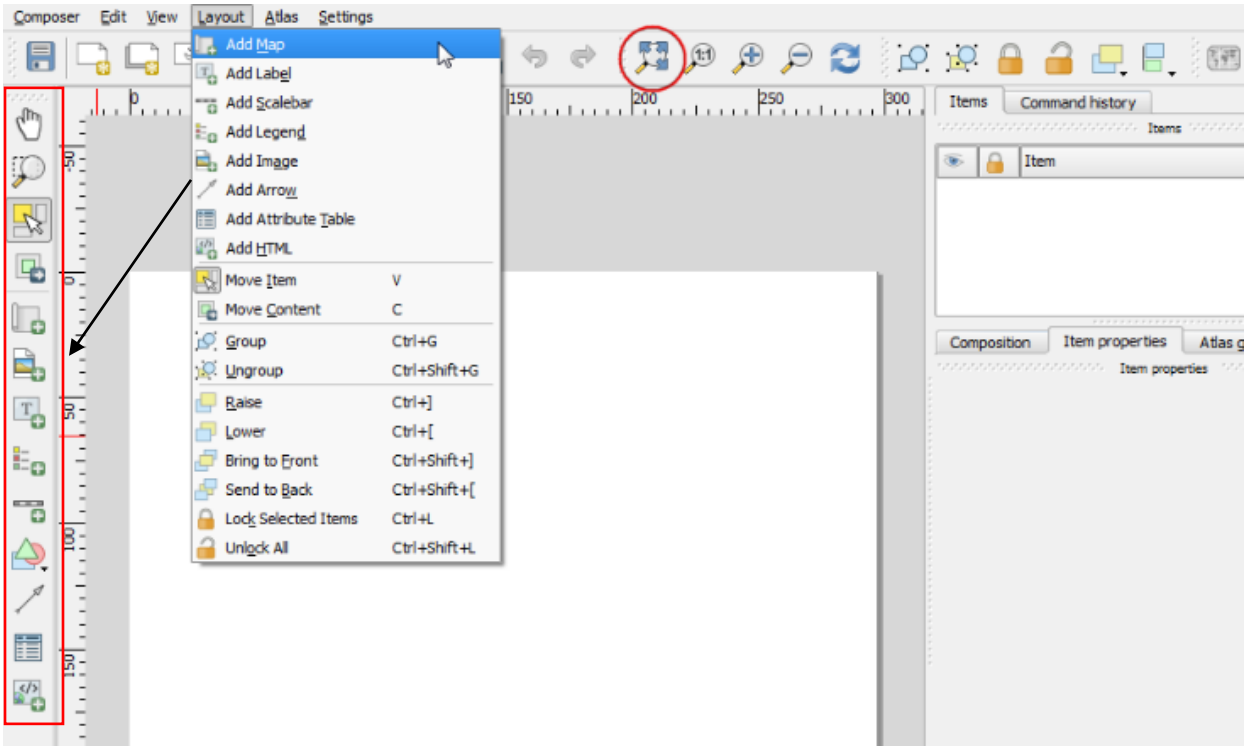
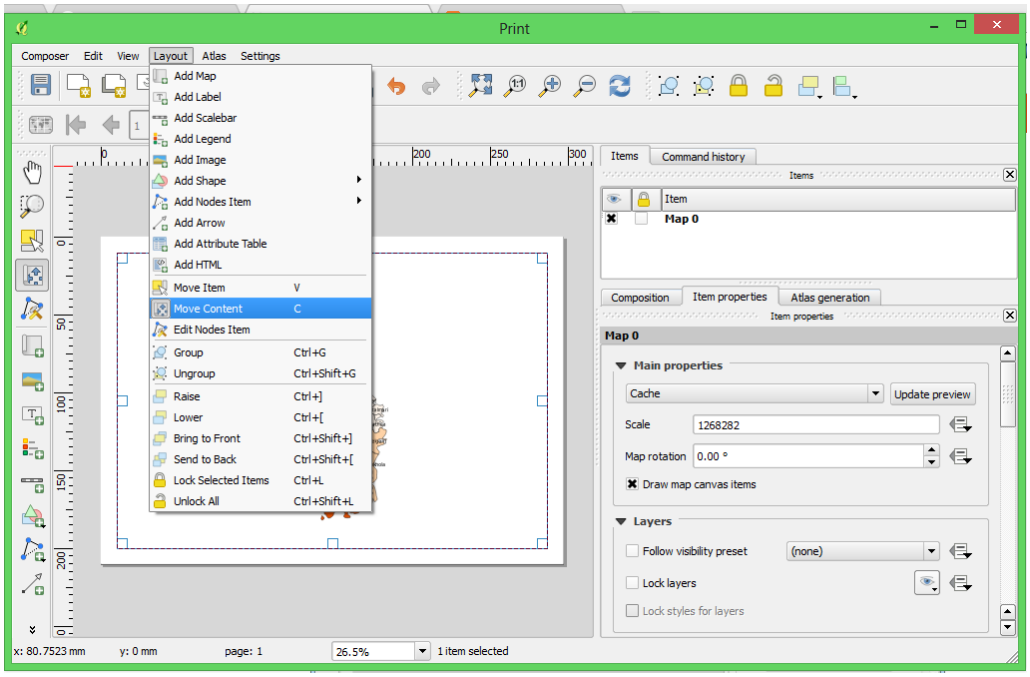


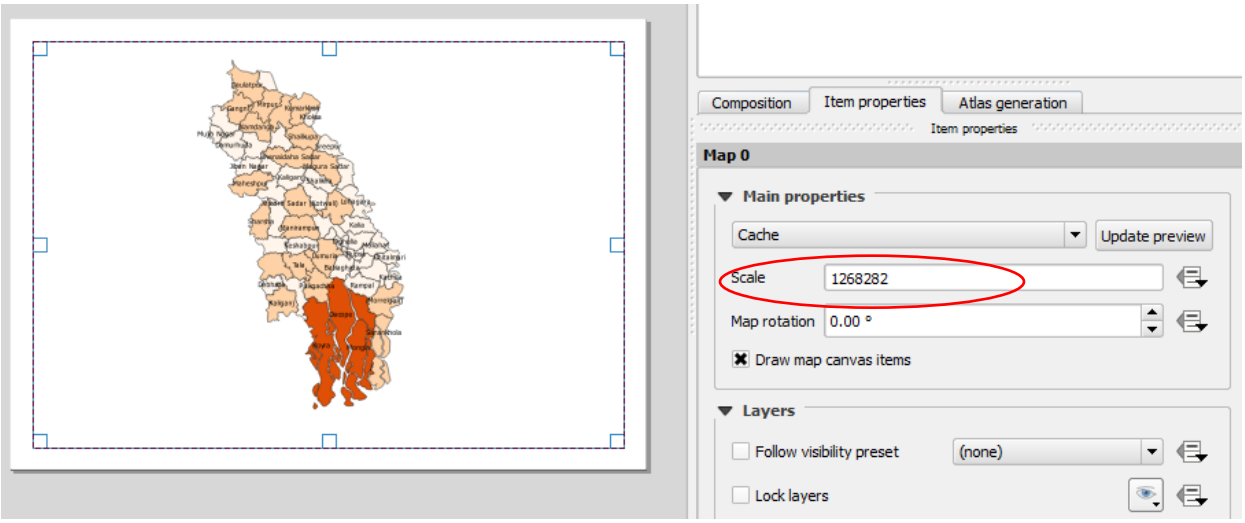
Figure 7. Layer Tab and Layer Panel

You will see that the rectangle window will be rendered with the map from the main QGIS canvas. The rendered map may not be covering the full extent of our interest area.

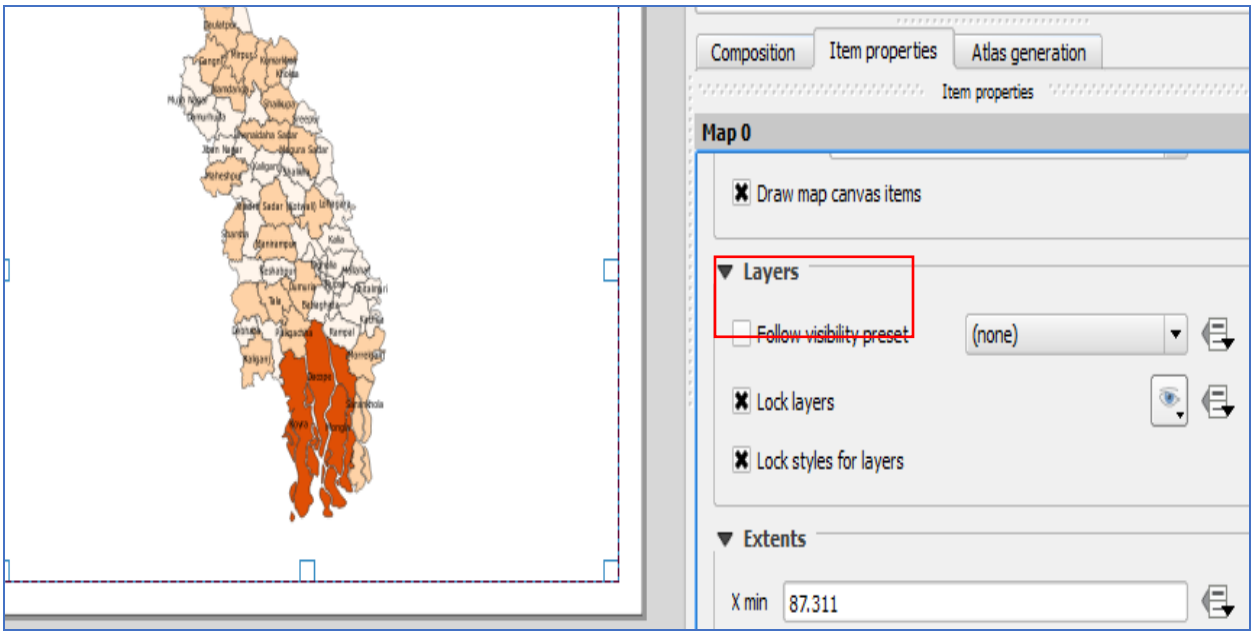
- Select Layout ▸ Move item content to pan the map in the window and center it in the composer.



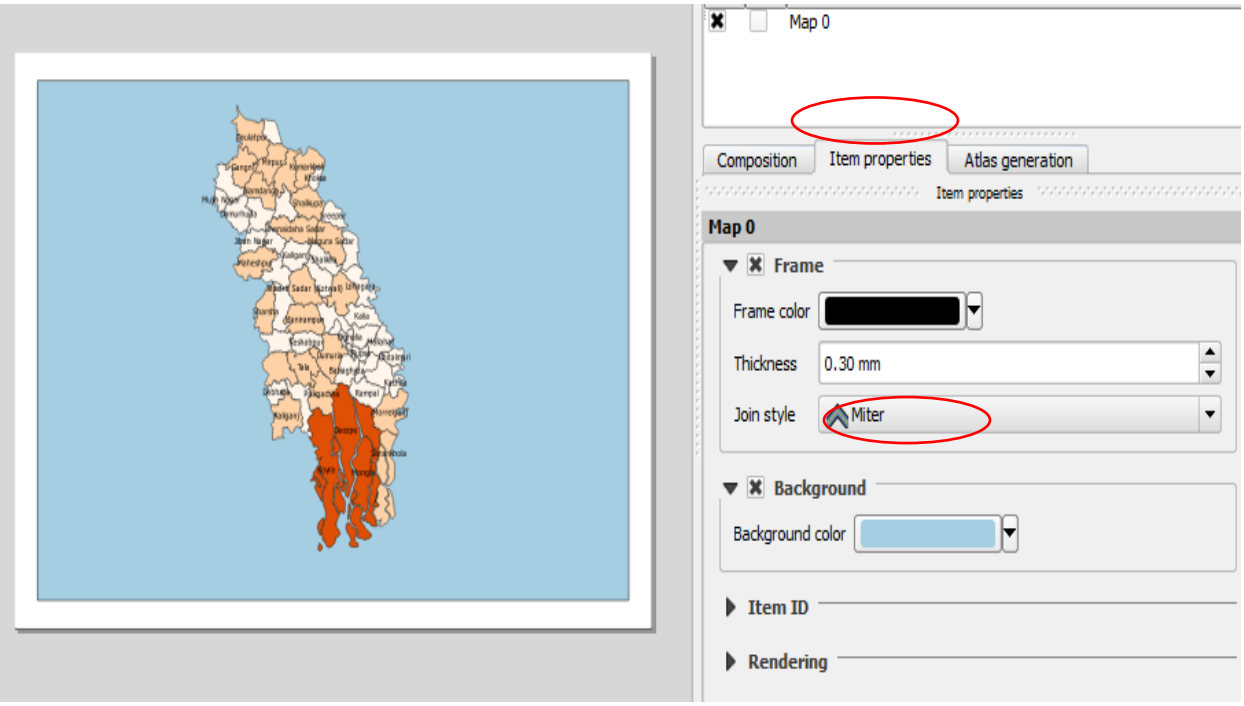
- Let us adjust the zoom level for the given map. Click on the Item Properties tab and change the scale value adjusted the composer view as shown in figures below.



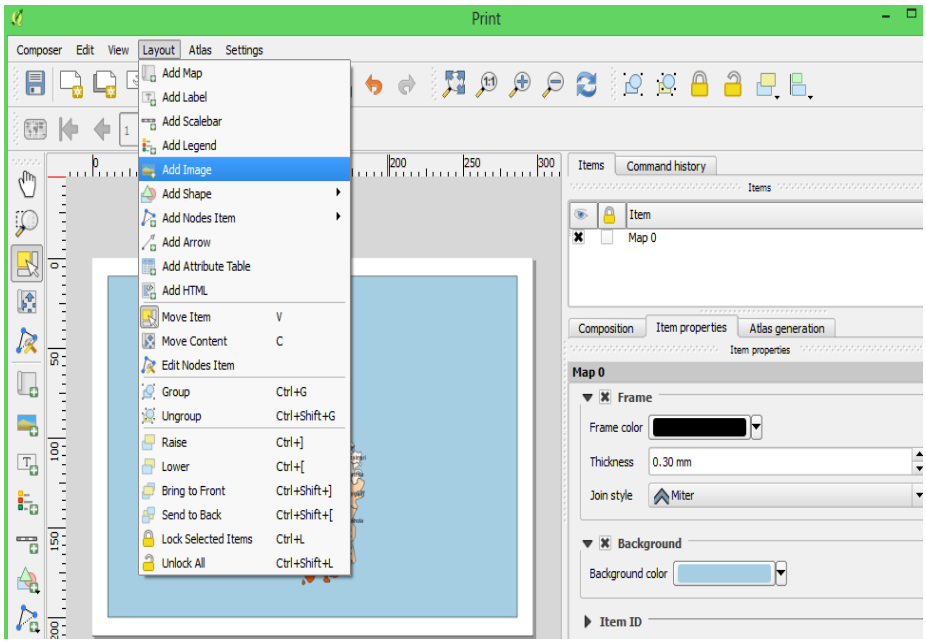
- Now we will add a map inset that shows a zoomed in view for the Tokyo area. Before we make any changes to the layers in the main QGIS window, check the Lock layers for map item and Lock layer styles for map item boxes. This will ensure that if we turn off some layers or change their styles, this view will not change.



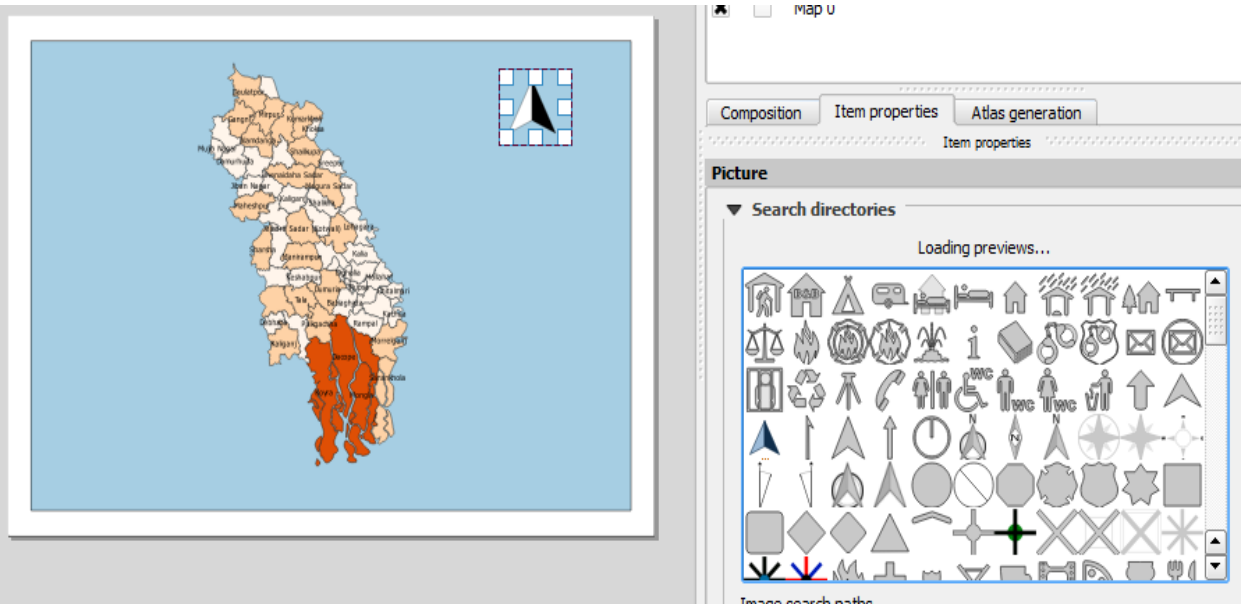
- We can change the frame of the map using the Frame properties from Item Properties panel at right side 9see the figure below).



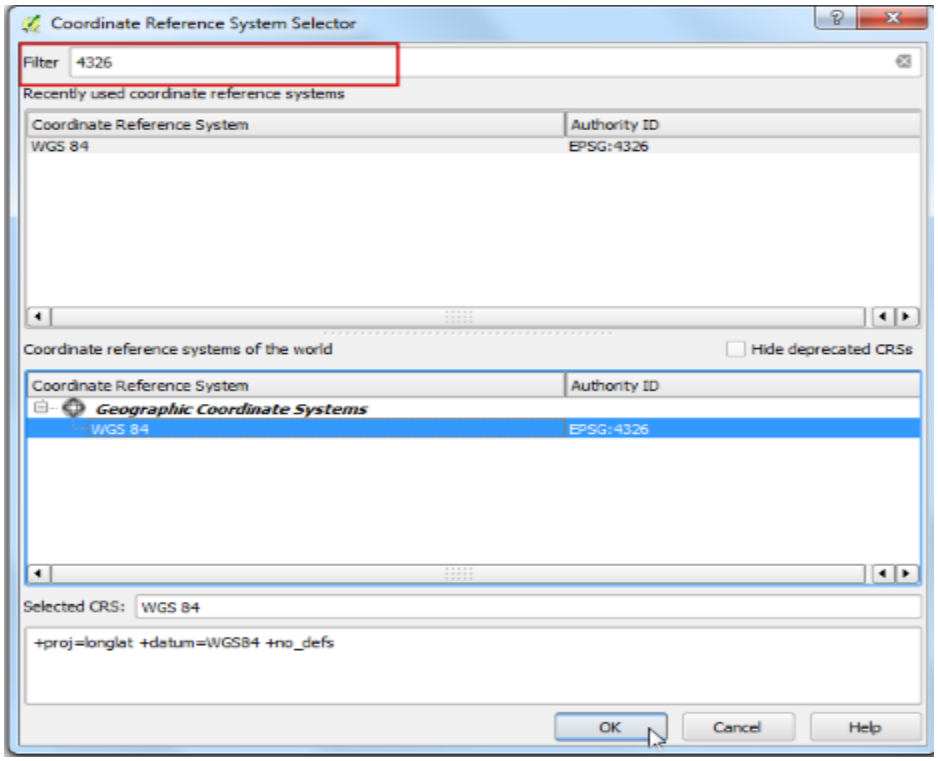
- Now we will add a North Arrow to the map. The Print Composer comes with a nice collection of map-related images - including many types of North Arrows. Click Layout ‣ Add Image.

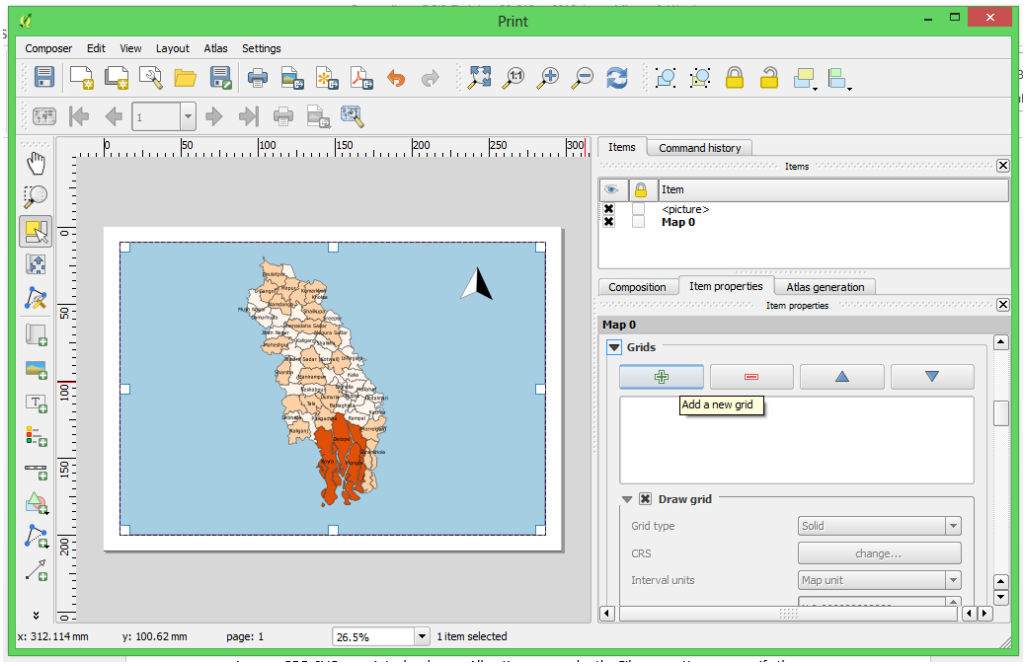


- Holding your left mouse button, draw a rectangle on the top-right corner of the map canvas. On the right-hand panel, click on the Item Properties tab and expand the Search directories section and select the North Arrow image of your liking as figure below

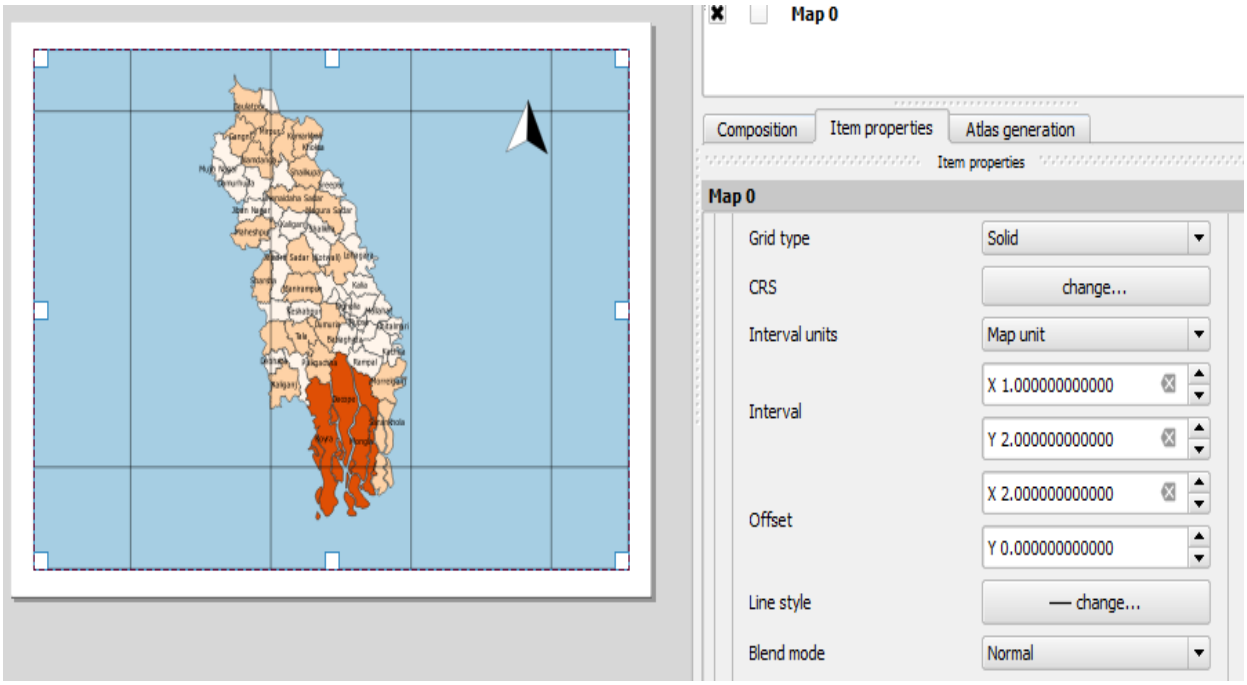


- Now that we have the map inset ready, we will add a grid and zebra border to the main map. Select the Map 0 object from the Items panel. In the Item properties tab, scroll down to the Grids section. Click the Add a new grid button.
- By default, the grid lines use the same units and projections as the currently selected map projections. However, it is more common and useful to display grid lines in degrees. We can select a different CRS for the grid. Click on the change... button next to CRS.
- In the Coordinate Reference System Selector dialog, enter 4326 in the Filter box. From the results, select the WGS84 EPSG:4326as the CRS. Click OK.

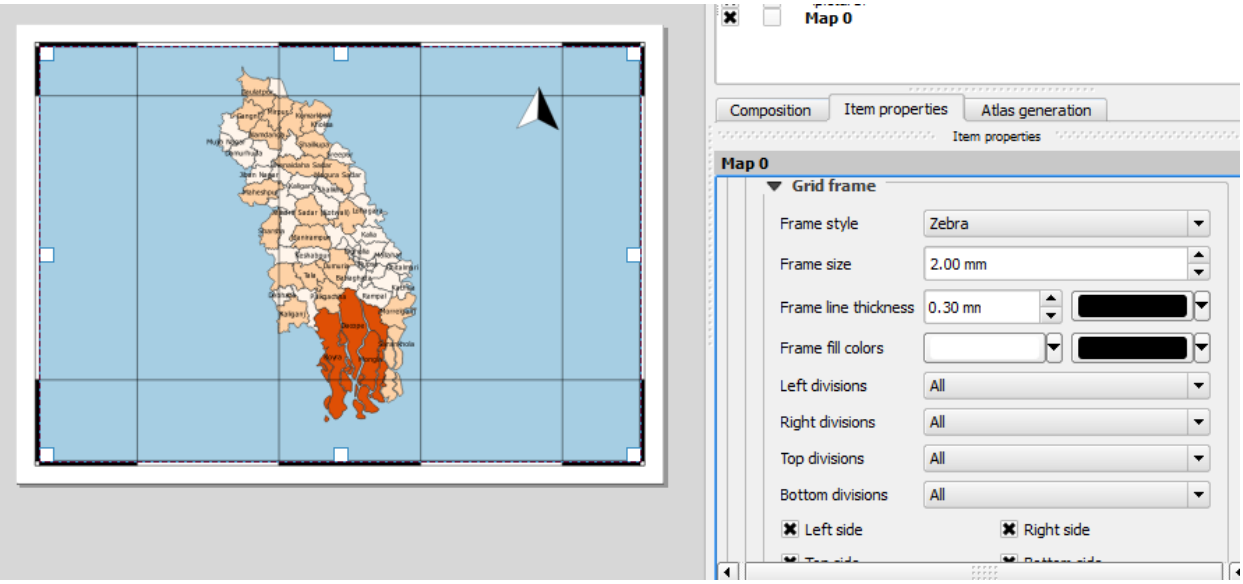




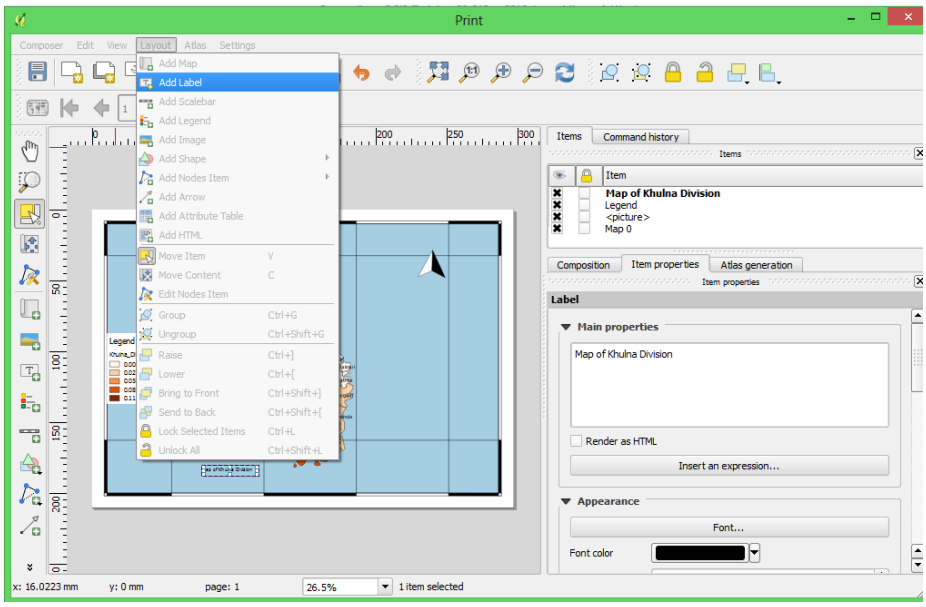
- Select the Interval values as 5 degrees in both X and Y direction. You can adjust the Offset to change where the grid lines appear.



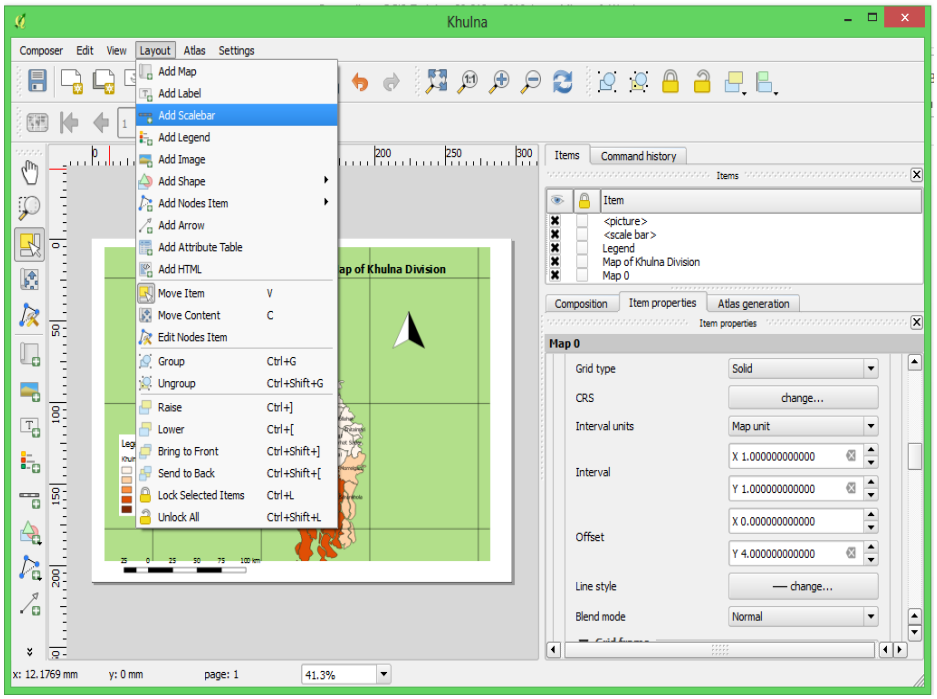
- We can change the Gid frame style from Grid frame panel, size, thickness etc as below.



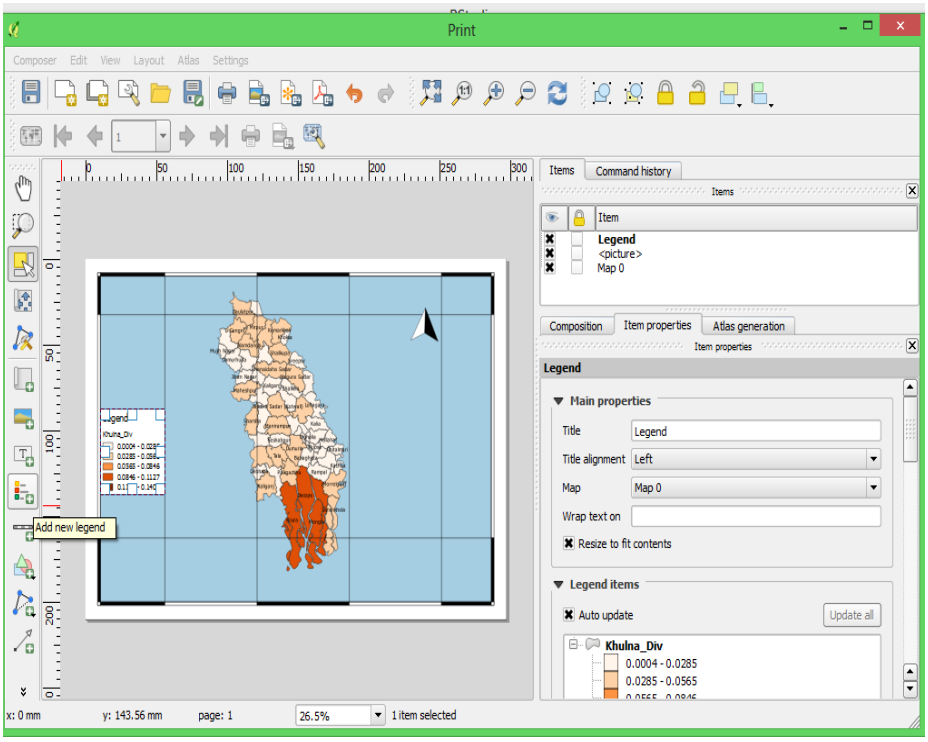
- It is time to label our map. Click on Layout ‣ Add Label.
- Click on the map and draw a box where the label should be. In the Item Properties tab, expand the Label section and enter the text as shown below.



- Click on the layout where you want the scalebar to appear. In the Item Properties tab, make sure you have chosen the correct map element for which to display the scalebar.
- Choose the Style that fit your requirement. In the Segments panel, you can adjust the number of segments and their size.

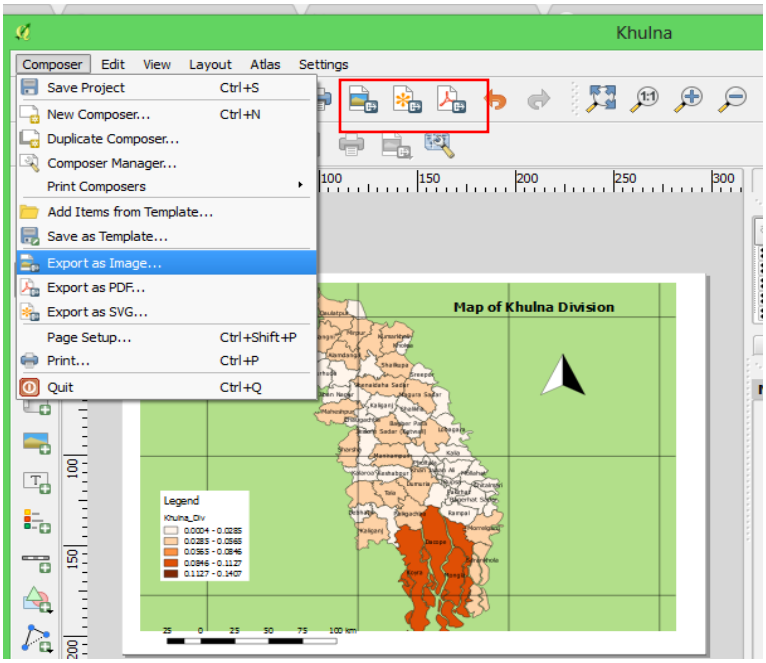


- Let's add the legend of the map by clicking add legend from Layer Tab and place the legend by click and dragging of left button of your mouse where you wish to place. Legend will be shown as available in the main QGIS data view as you displayed.



Export Maps

When you are satisfied with everything on the map and are ready to deliver, you can export your map as images, PDF, SVG, or print a hard copy. All options are under the File menu. You can specify the directory and file name of the map in this dialog. But, most importantly, you need to choose an appropriate file format by clicking on the Save as type dropbox. The most frequent-used formats are JPEG and PDF. JPEG is a popular graphic file format, which is easy to be inserted into word as a graph, while PDF is best used for sharing. The printed copy of PDF will be identical regardless of your computer (and printer) environment.



Appendix

Food and Agriculture Organization of the United Nation

Food and Agriculture Organization of the United Nation

UNREDD National Programme (UNJP/BGD/057/UNJ)

Training on QGIS

Attendance of the participants

Date: 06-09 February 2017

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Food and Agriculture Organization
of the United Nation

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