Introduction to QGIS and Kobotoolbox for Mapping Flood Based Farming Systems

KoBoToolbox

User Manual

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About this Manual

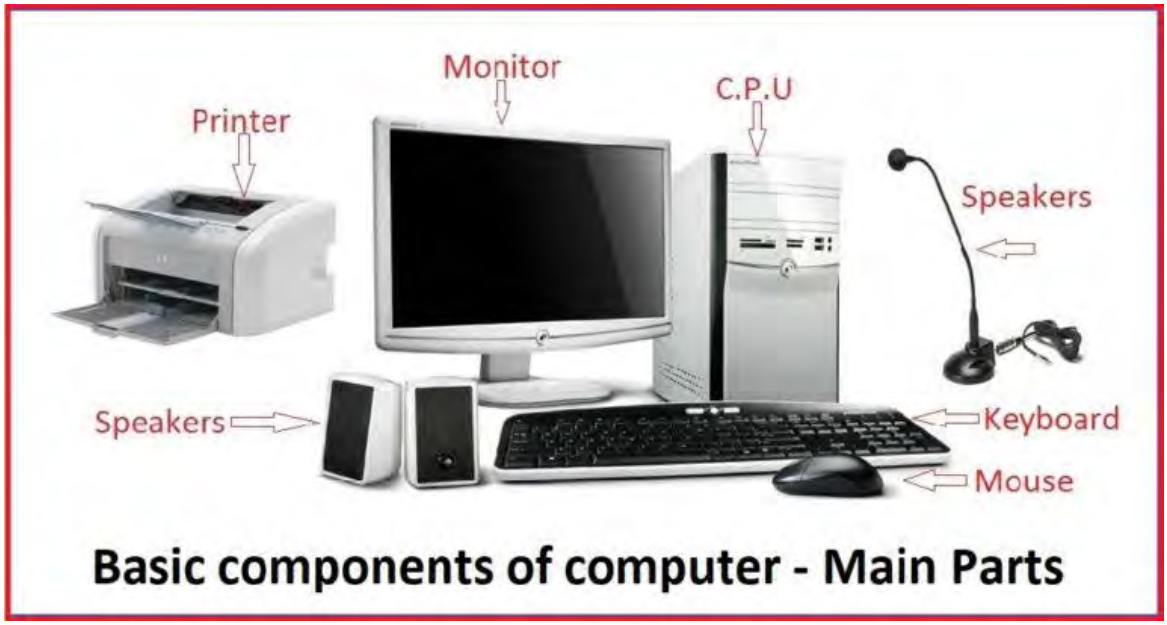
This User Manual was developed based on an introductory training on the application of Geospatial Information Systems conducted by the International Water Management Institute (IWMI) for the Department of Agriculture staff stationed in the Ayeyarwady Delta. The training and this Manual were financed by the European Union through IFAD under the Testing Flood-Based Farming Systems Project (FBFS), and the CGIAR Water, Land and Ecosystems Research Program, both managed by IWMI. The training and this Manual are intended to provide a foundation to enable the DoA use basic geo-spatial data collection and analysis in future land use planning initiatives, that underpin the implementation of the current Agriculture Development Strategy, and the development and implementation of future agriculture strategies.

The gracious support provided by the Agriculture Department's Land Use Division and the Ayeyarwady Division co-convening the training that informs this Manual is greatly appreciated.

1. Computer and Laptop

1.1 Main components of a computer

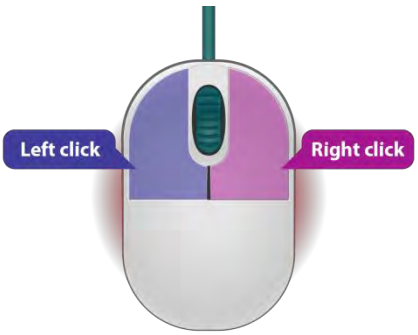
1. Monitor
2. Keyboard
3. Mouse
4. Speaker
5. Printer
6. C.P.U



The components we use most for GIS operations are the screen, keyboard and mouse.

Mouse – right click, left click

Screen and keyboard



1.2 Folder

A folder is like a room where things are kept. It is important to keep track of your folders just like how you keep track of where items are located in your house. Within a folder, you can have many folders. These are then called *subfolders*. To find folders easily, it is important to name your folders well so they can be recognized. One good practice is not using a space in the folder names since this can cause an error in GIS software. It is better to replace the spaces with an underscore (_).

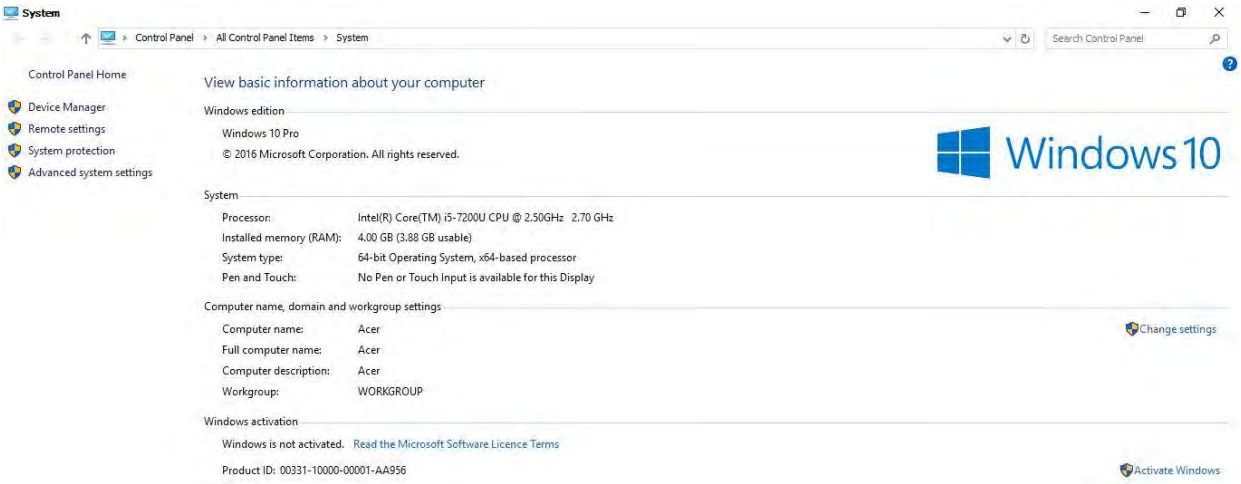
1.3 Creating a New Folder

To create a new folder, Right click within a blank space where you want to be folder created.

1.4 Properties of computers and laptops

Before the installation of QGIS software, it is essential to know the properties of the computers or laptops we use. This is because there are several QGIS software for different computer specifications. To find the properties of your computer, right click on "**My Computer**" for older computer versions or "**This PC**" icon and then click on "**Properties**". The properties and specification of the laptop/computer are then displayed as shown below.

Based on the specifications you can install software for that specification.



There are two basic types of Window Versions; a 32 bit version and a 64 bit version. The 32 bit version is older while newer computers are 64 bit. It is important to note the version you have since the software are created for each version.

2. Definition: What is GIS?

GIS stands for *Geographic Information System*. It is a system that contains tools for capturing, storing, analyzing and displaying spatial data from the real world.

GIS is composed of two components:

1. Geographic
2. Information

The geographic components contain (1) Spatial Information (*Where*) and the Information part is (2) Attribute Information (*What*).

GIS software can be classified into two types of software:

1. free (open-source) and
2. paid software.

Among the free software, QGIS is very commonly used.

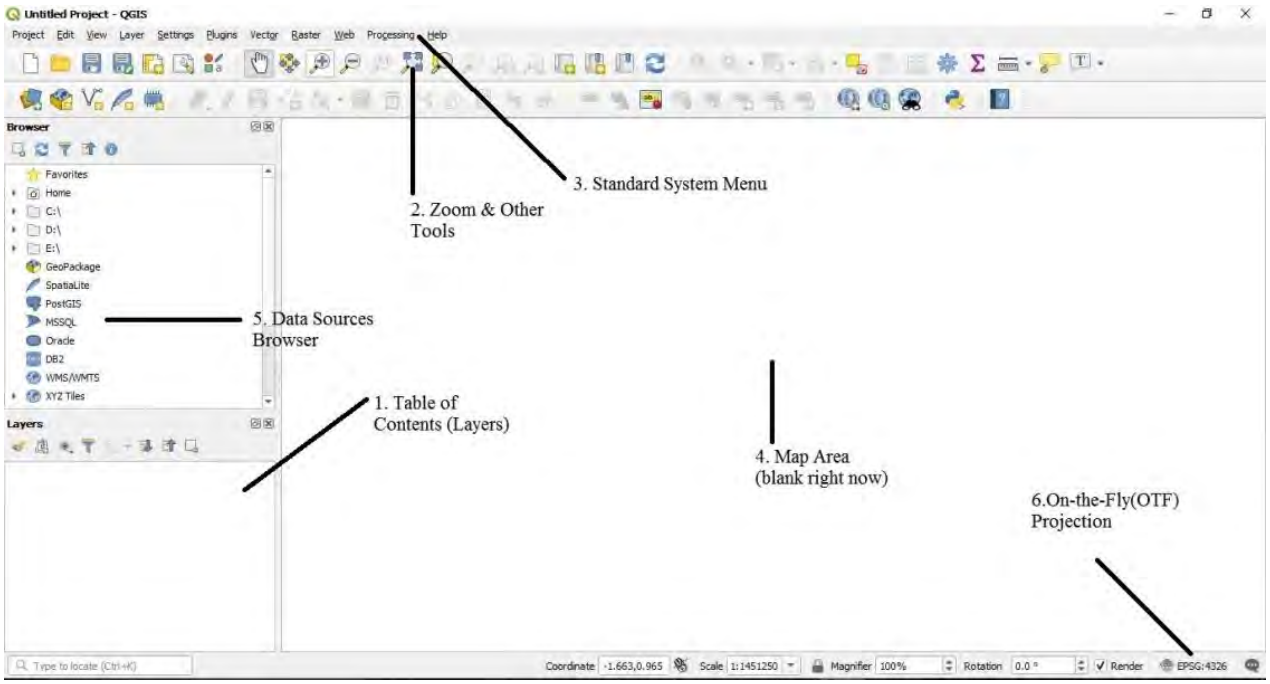
2.1 How to install QGIS software

There are several versions of QGIS software. The most current version is QGIS 3. However before installing you need to choose the appropriate version of your system. Mainly whether your computer/ laptop is a 32 bit system or 64 bit system. From your computer properties noted above, select the appropriate versions of QGIS to install. You can download the software from https://www.qgis.org/en/site/forusers/download

3. QGIS interface

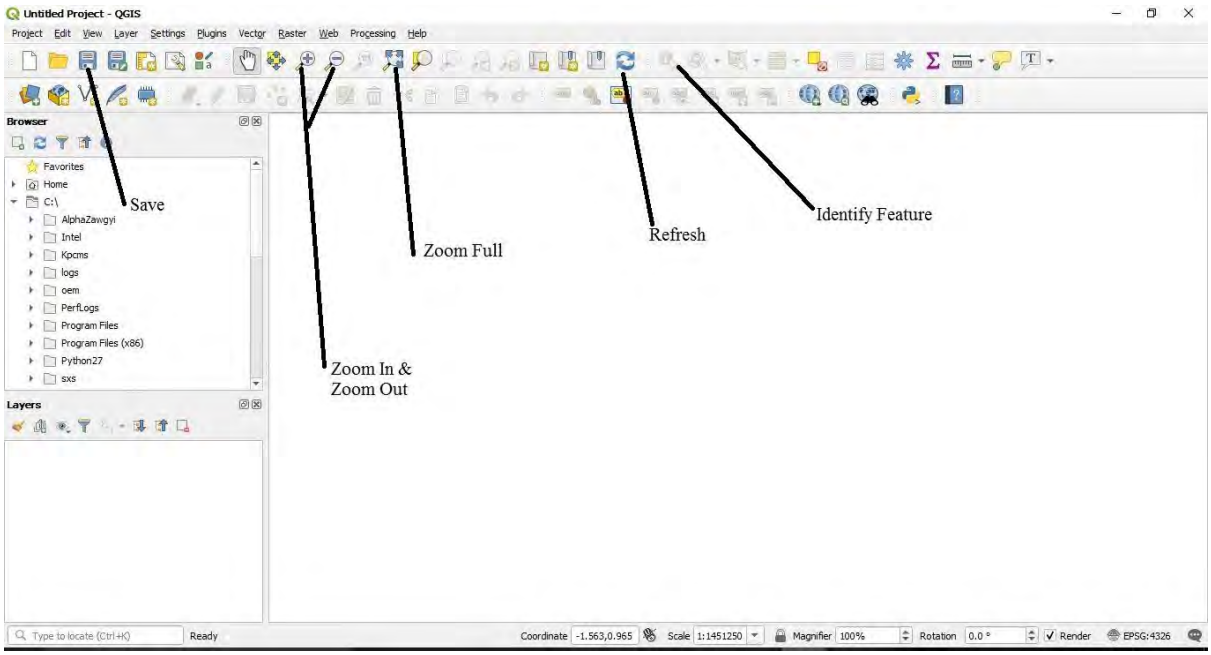
Start GIS from your Start Menu.

Before opening the layers in QGIS, we need to learn some important features of the software.



A good way to know the meaning of the icons below the standard system menu bar is to place the cursor over the icons that you are interested in.

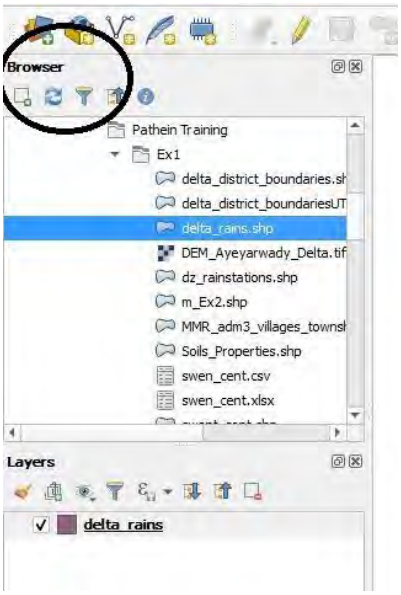
Some common icons we use in the QGIS software are as below.



4. Adding layers in QGIS

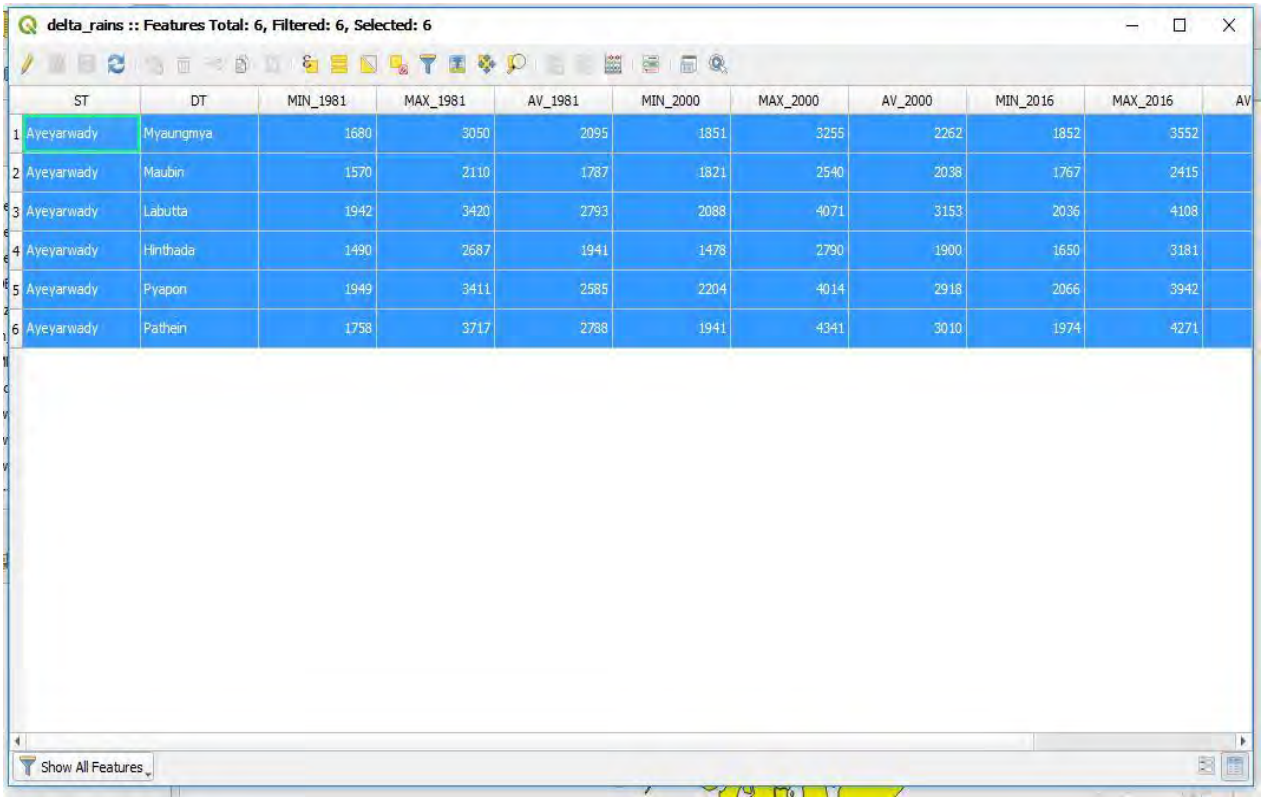
There are several ways to add new layers to your GIS project. A quick way is to first, click "**View**" from the menu bar. Then choose "**Panel**". Then select "**Browser**" and "**Layer**".

To add the layers, find the file in the browser and then double click to the layer that we want to open.



5. Attribute Table to show the information of the layer

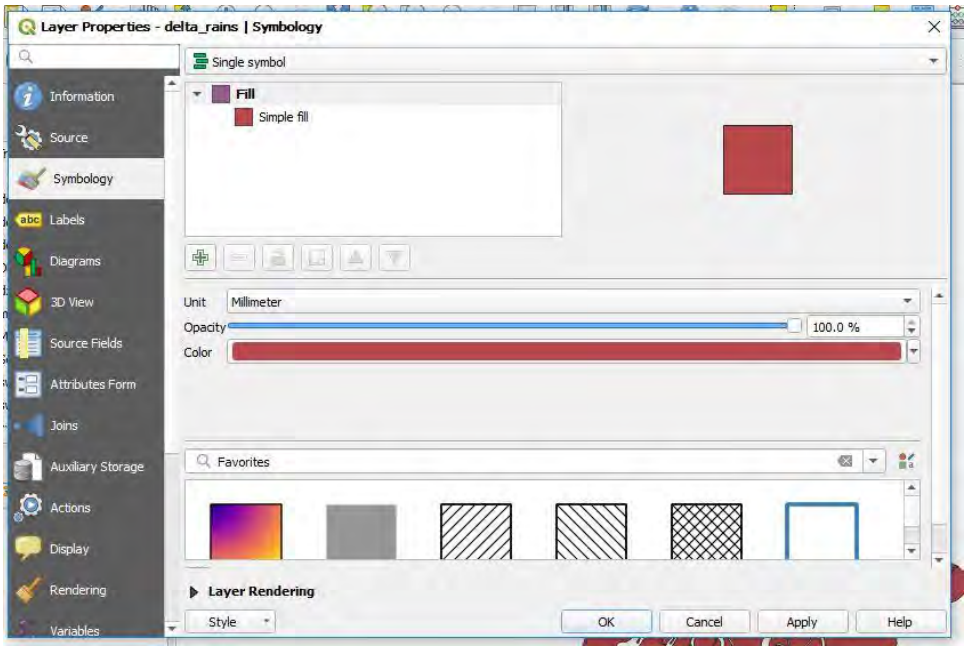
The attribute table provides information about the data we are interested in. To open the attribute table, Right click the layer that we want to find the detailed information about and click "**Open Attribute Table**". Then the box showing the detailed information will be shown as below.



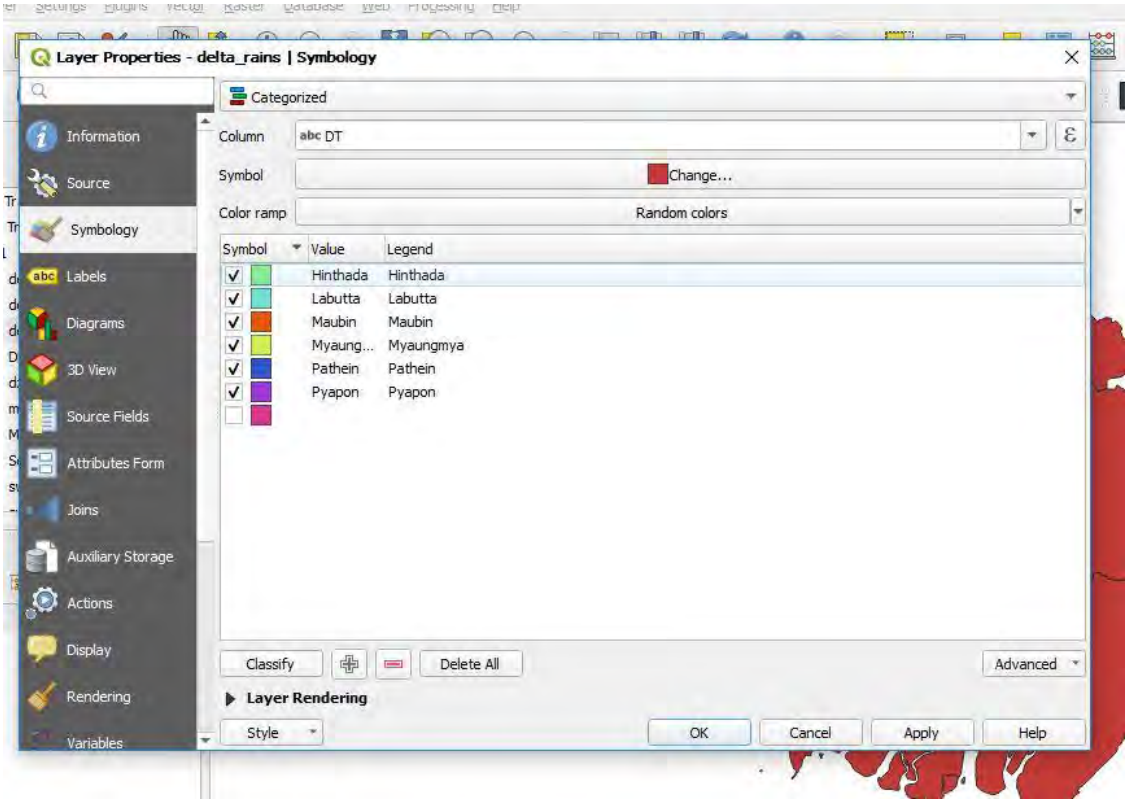
	ST	DT	MIN_1981	MAX_1981	AV_1981	MIN_2000	MAX_2000	AV_2000	MIN_2016	MAX_2016	AV
1	Ayeyarwady	Myaungmya	1680	3050	2095	1851	3255	2262	1852	3552	
2	Ayeyarwady	Maubin	1570	2110	1787	1821	2540	2038	1767	2415	
3	Ayeyarwady	Labutta	1942	3420	2793	2088	4071	3153	2036	4108	
4	Ayeyarwady	Hinthada	1490	2687	1941	1478	2790	1900	1650	3181	
5	Ayeyarwady	Pyapon	1949	3411	2585	2204	4014	2918	2066	3942	
6	Ayeyarwady	Pathein	1758	3717	2788	1941	4341	3010	1974	4271	

6. *Categorizing map layer by color*

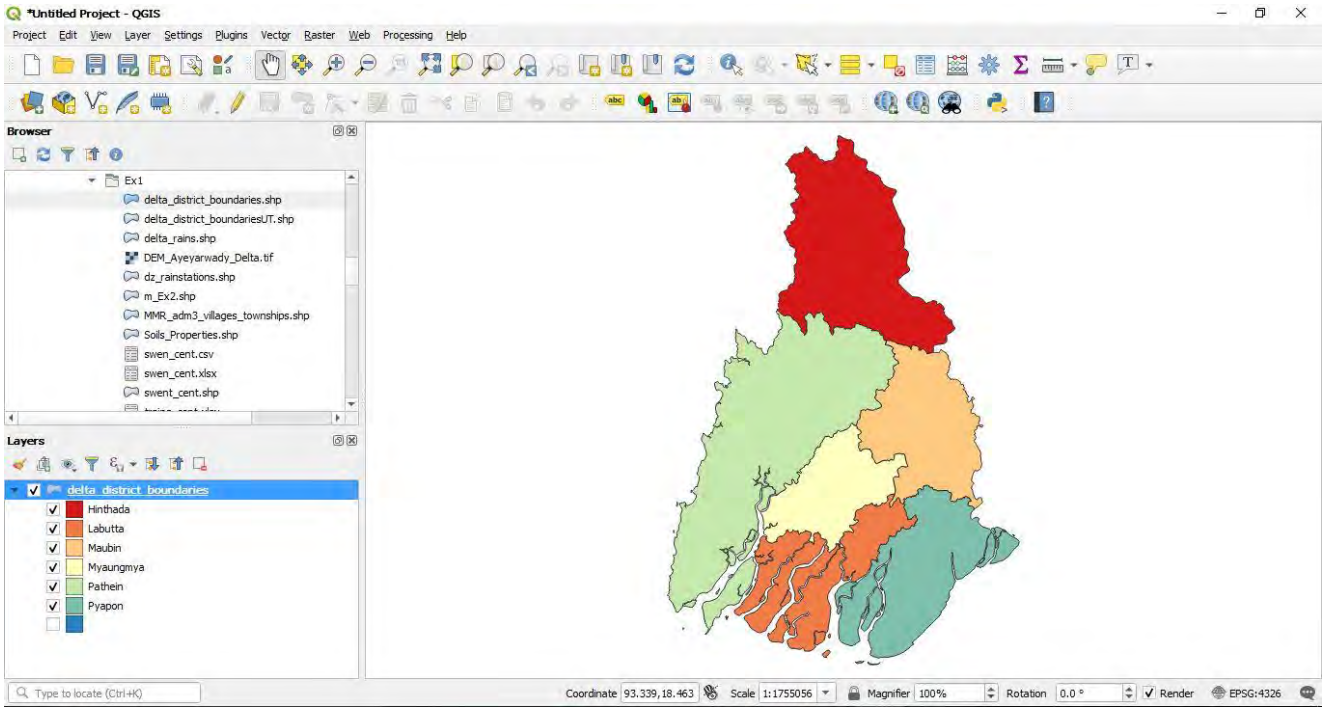
Right click the layer that we want to categorize and select "**properties**". Then the panel box as below will appear.



Choose categorized. Choose the column and click "**Classify**". Then click "**Apply**" button and "**Ok**" button.

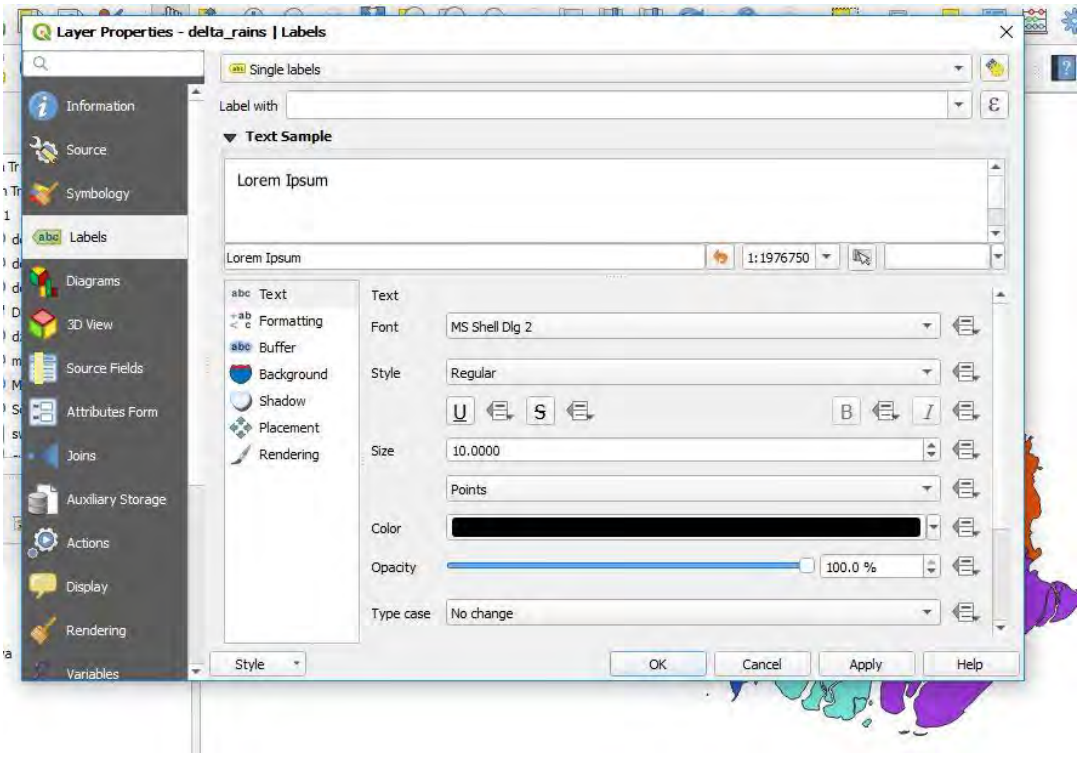


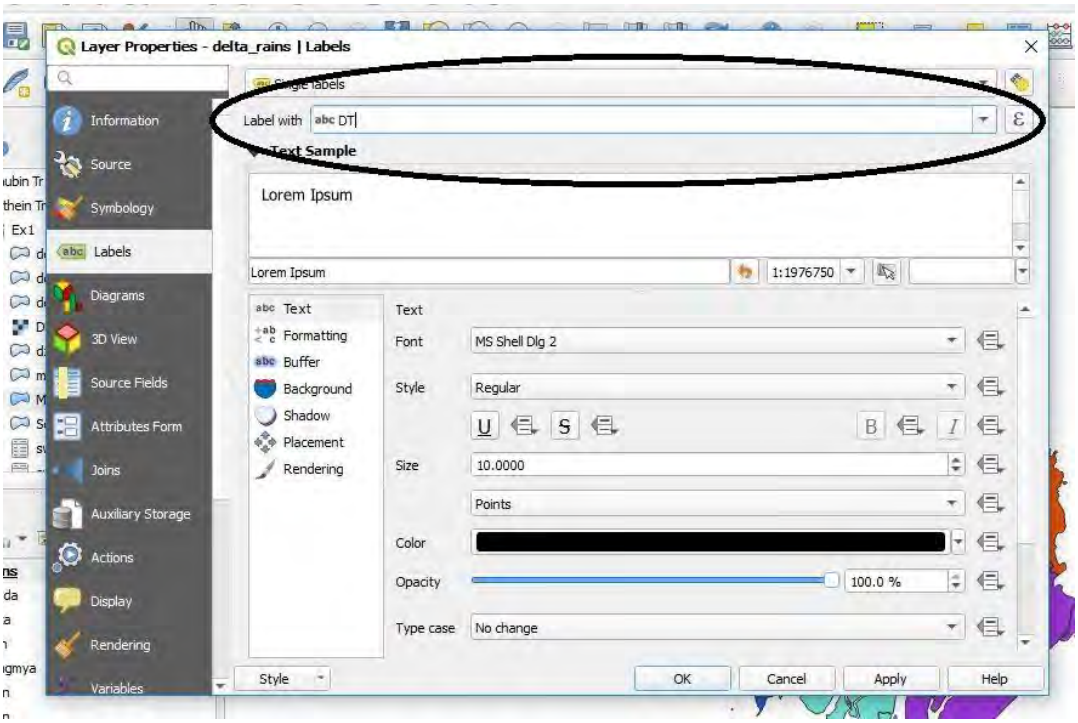
The final result will be as below.

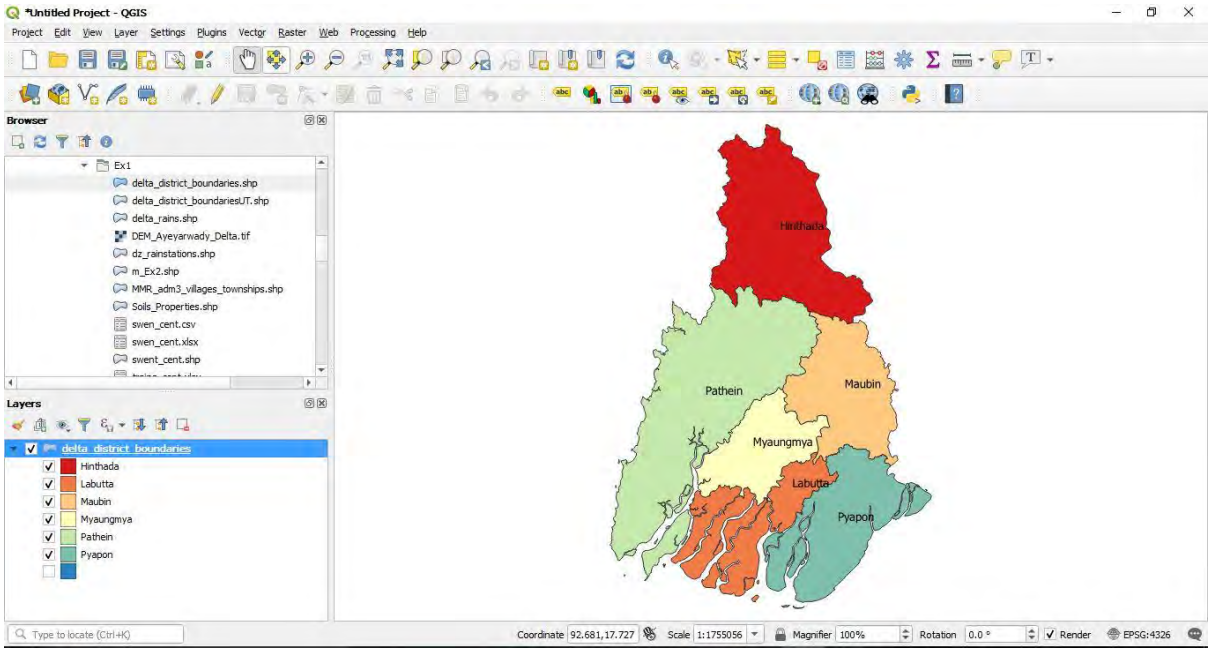


7. Adding label to map layer

Right click on the layer and click "**Properties**". Then click "**Label**" and choose single label. Choose "**Label with**" column. Finally click "**Apply**" and "**Ok**".

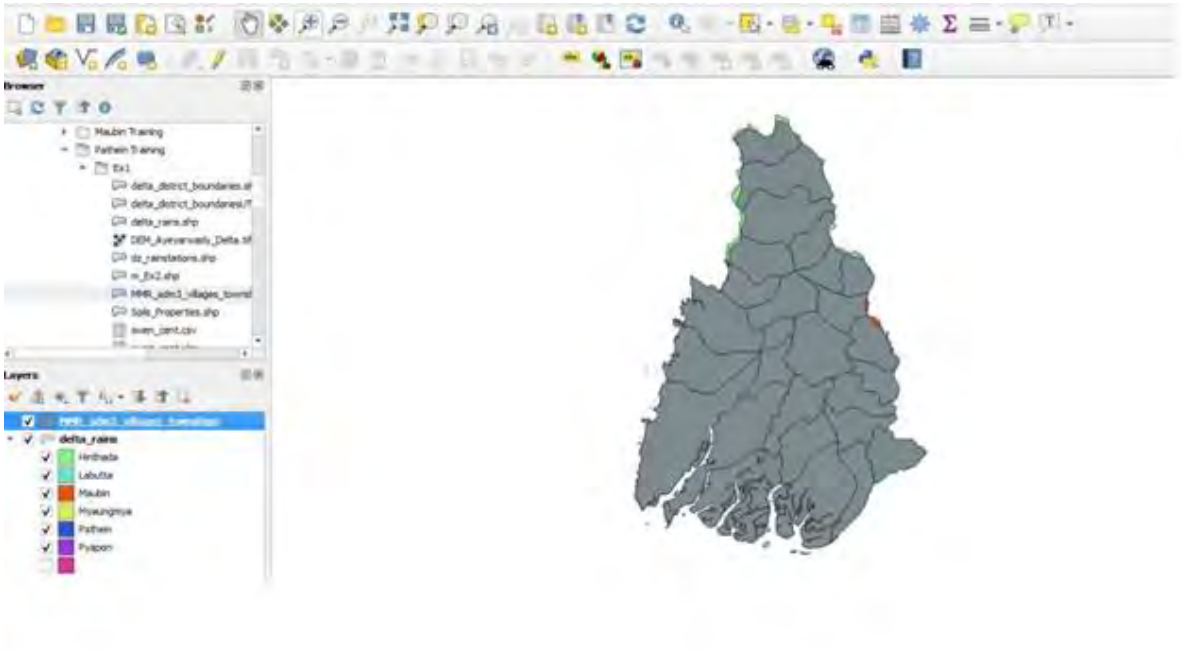




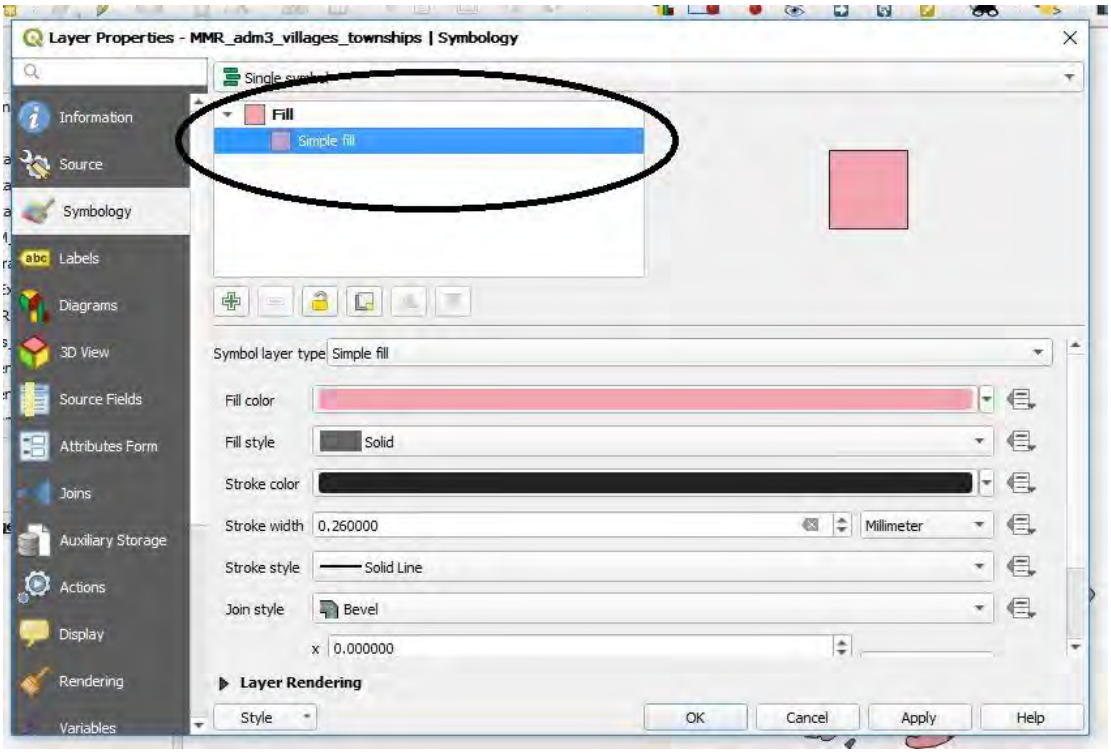

*Untitled Project - QGIS
Project Edit View Layer Settings Plugins Vector Raster Web Processing Help
Browser
Ex1
delta_district_boundaries.shp
delta_district_boundariesUT.shp
delta_rains.shp
DEM_Ayeyarwady_Delta.tif
dz_rainstations.shp
m_Ex2.shp
MMR_adm3_villages_townships.shp
Soils_Properties.shp
swen_cent.csv
swen_cent.xlsx
swent_cent.shp
Layers
delta_district_boundaries
Hinthada
Labutta
Maubin
Myaungmya
Pathein
Pyapon
Hinthada
Maubin
Pathein
Myaungmya
Labutta
Pyapon
Type to locate (Ctrl+K)
Coordinate 92.681,17.727
Scale 1:1755056
Magnifier 100%
Rotation 0.0 °
Render
EPSG:4326

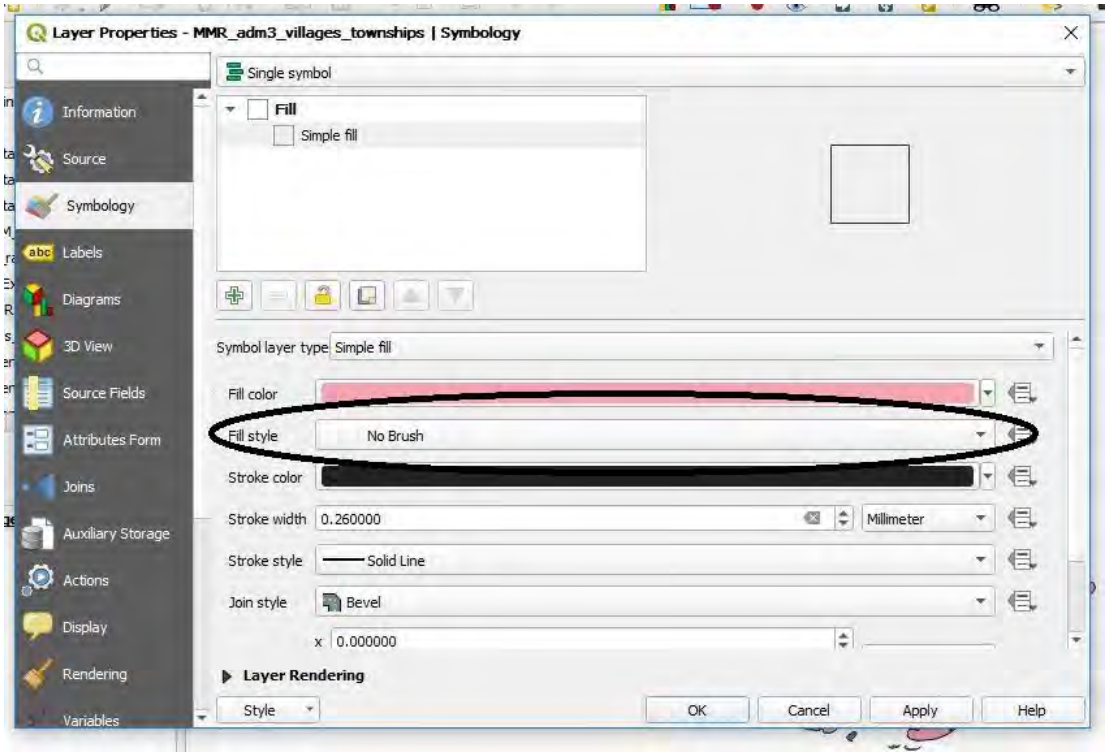
8. Making the upper layer transparent in order to see the first layer

Open at least two layers. Right click the top layer and click "**Properties**".

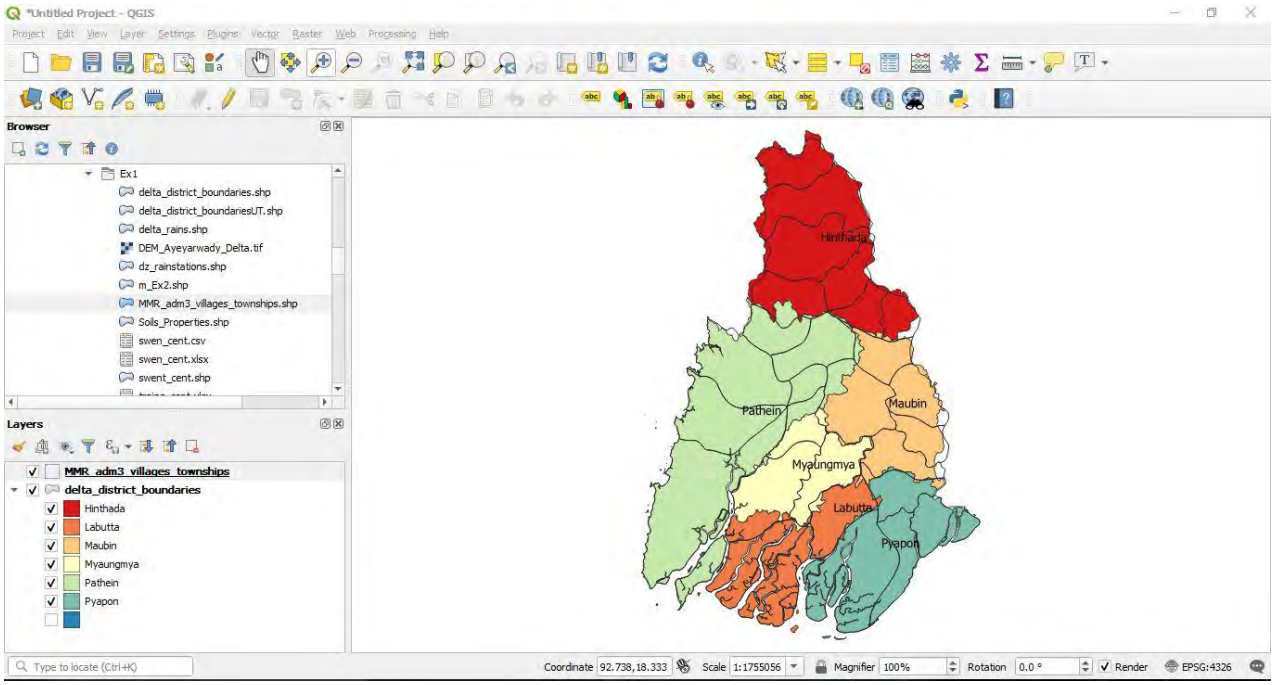


Click "**Symbology**" and click "**Simple Fill**". Then change Fill Style to "**No Brush**". Finally click "**Apply**" and "**Ok**".





The final result is as below.



9. Kobo Toolbox

Kobo Toolbox is an open-source software platform that can be used for digital data collection. Kobo Toolbox provides a good platform to collect data on your mobile devices such as tablets and smart phones. Kobo Collect is the android-based application used to collect the data which feeds into your Kobo Toolbox account.

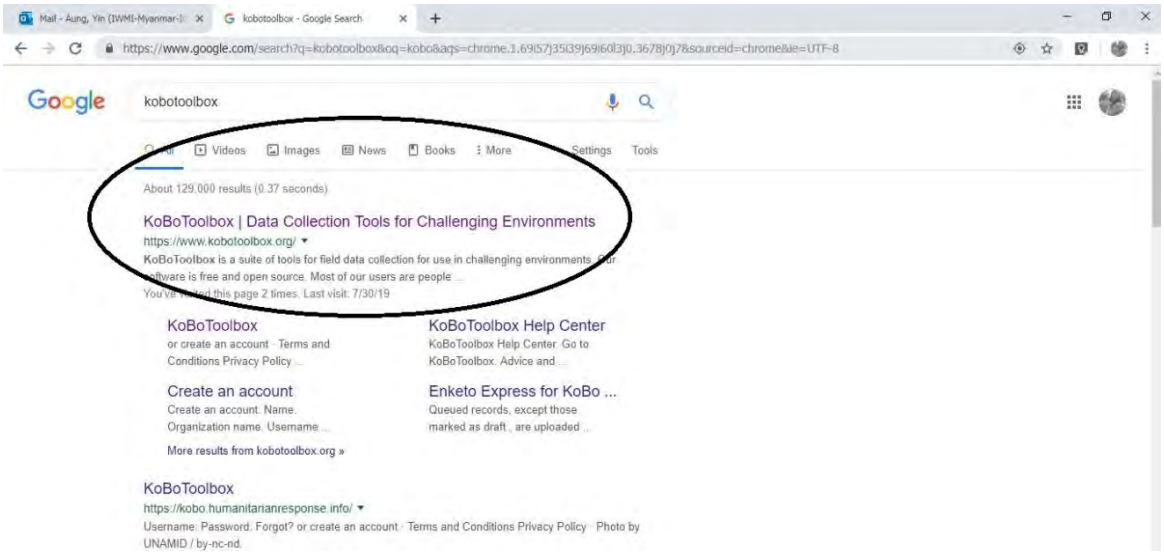
9.1 Creation of new account in Kobo Toolbox

Create the new account in Kobo Toolbox.

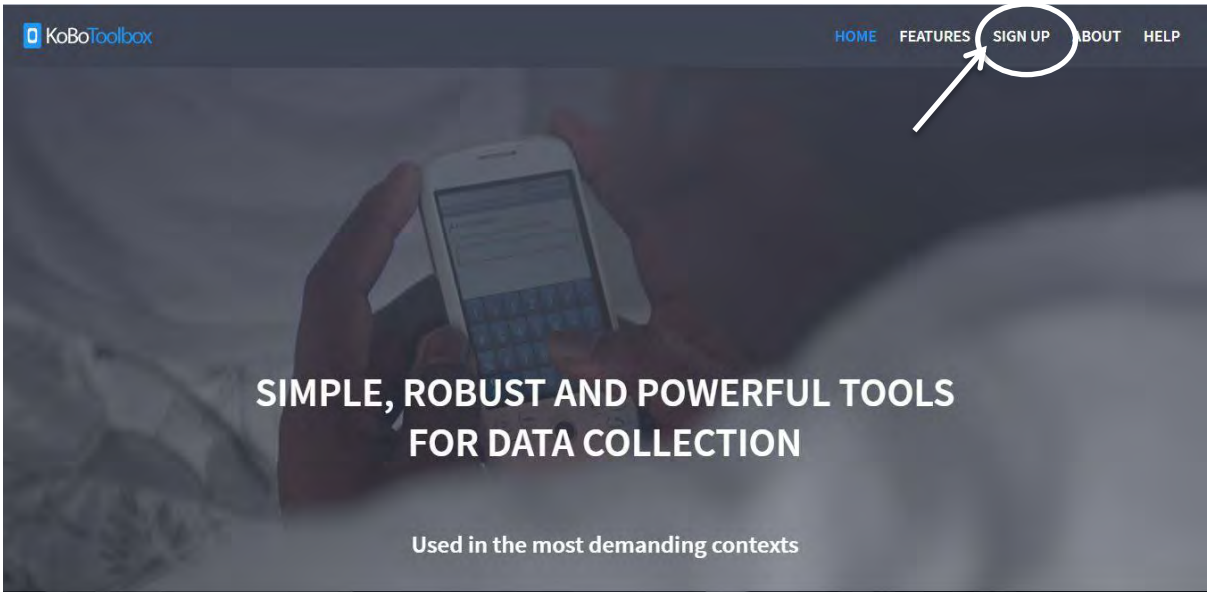
Requirements:

1. Internet
2. Android device
3. Email account

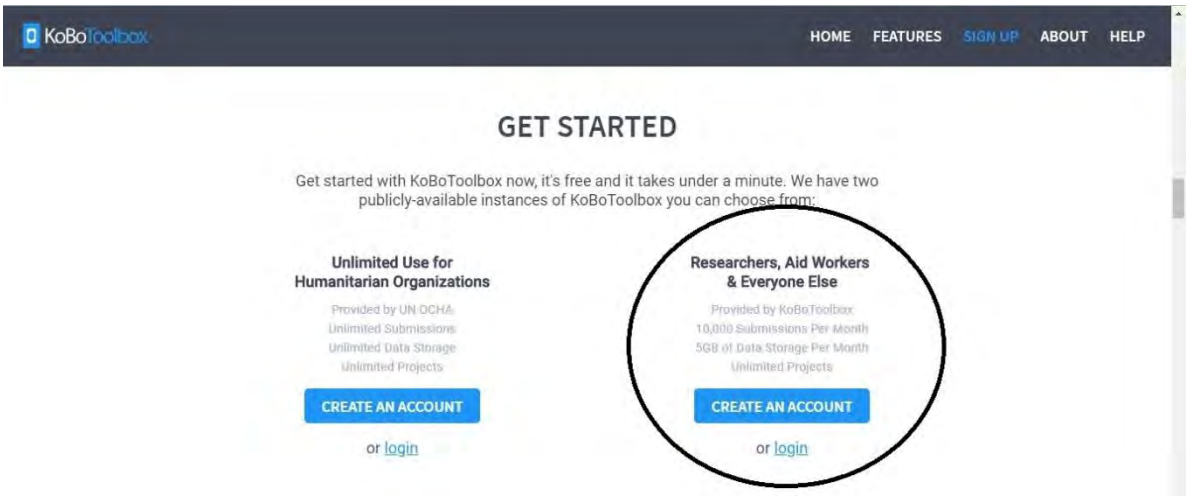
Go to the Kobo Toolbox website by searching for kobotoolbox on google.com



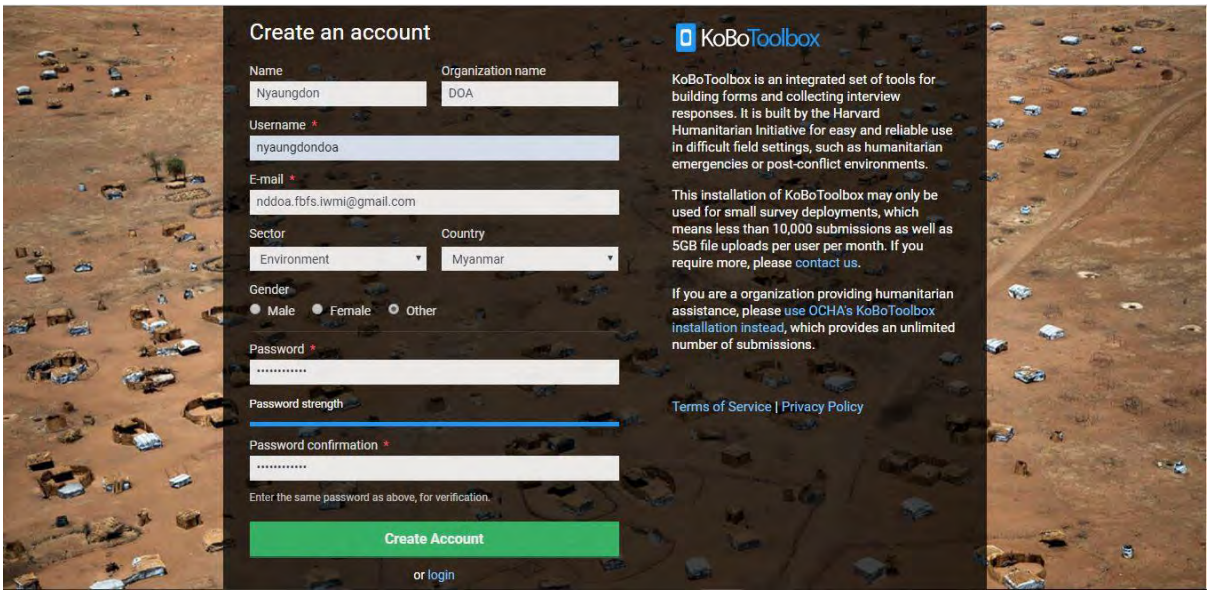
Click the "**Sign up**" button.



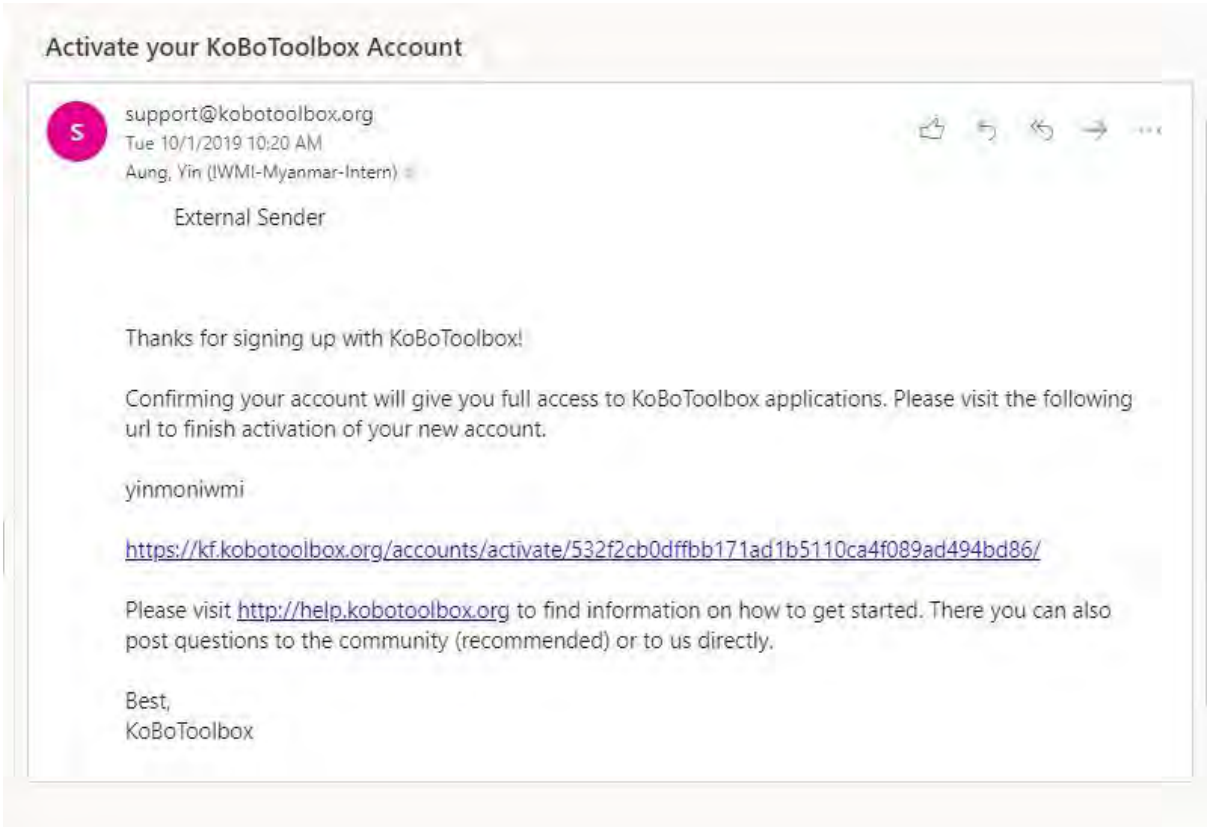
Choose "**Create an account**" under the title of **'Researchers, aid workers & everyone else'**.



Fill the form to create the new Kobo Toolbox account.

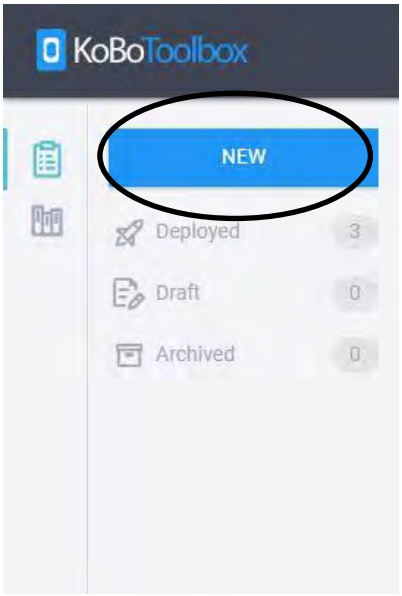


Activate the new account from your email account (eg. gmail) i.e to click the link below your user name.

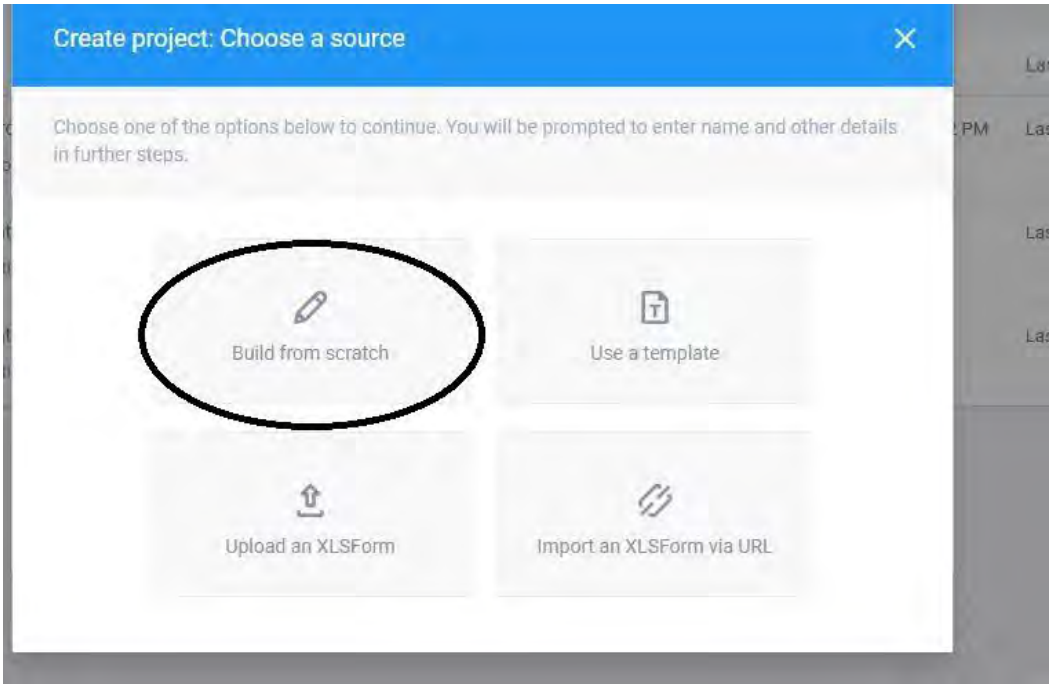


10. Creation of survey question form in Kobo Toolbox

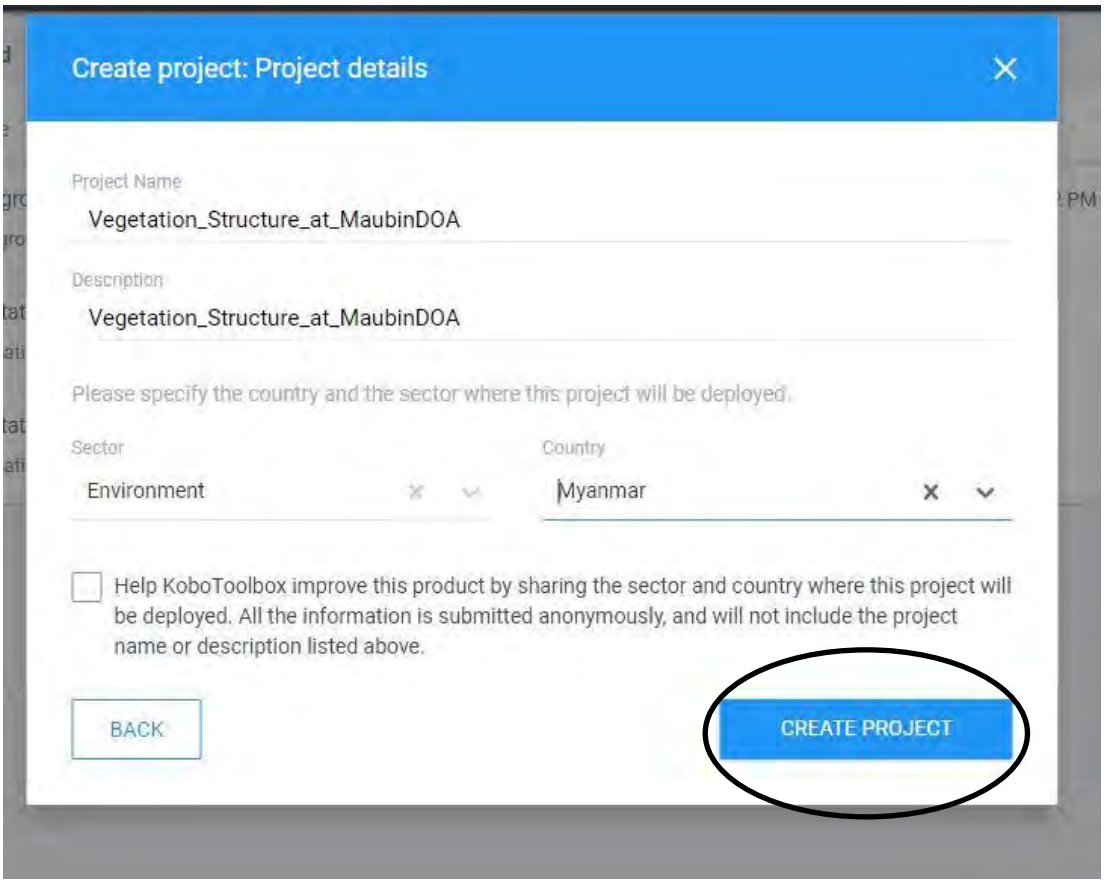
Click the "**New**" button.



Choose "**Build from scratch**" to create the question in Kobo Toolbox.

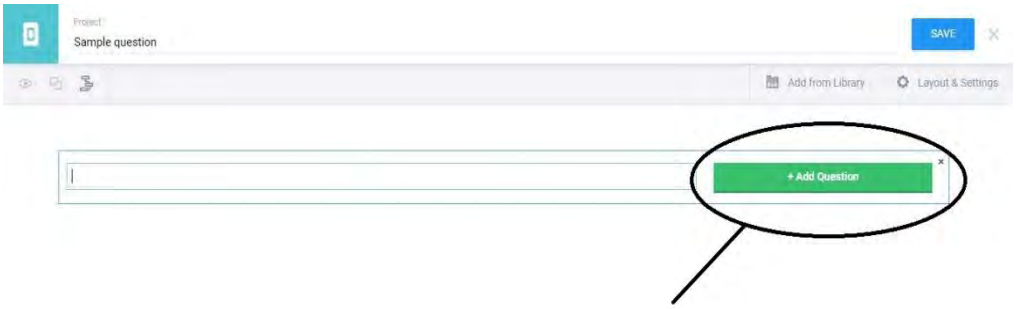


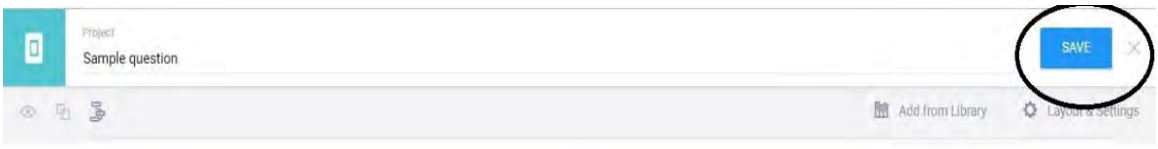
Fill the title of the questionnaire and create the question form. Then click on **"Create Project"**.



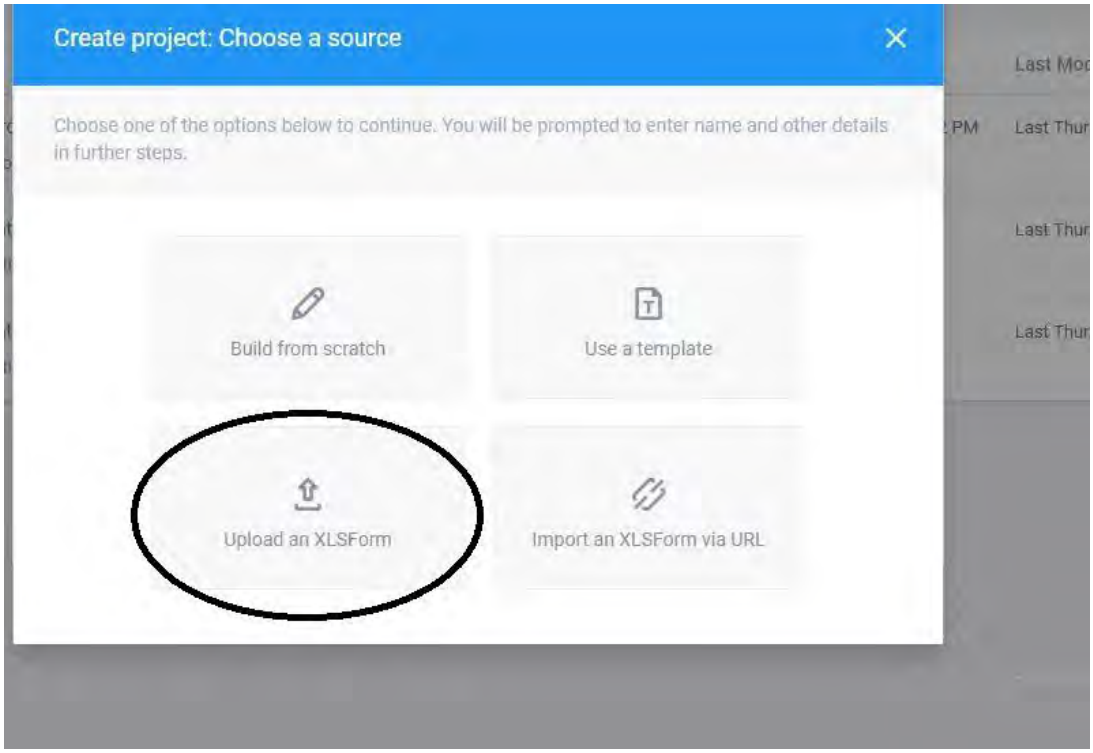
To create the questionnaires, click the plus "+" sign as circled in the diagram.

Click "**Add Question**" button and choose the question type. After creating the question, click save button.

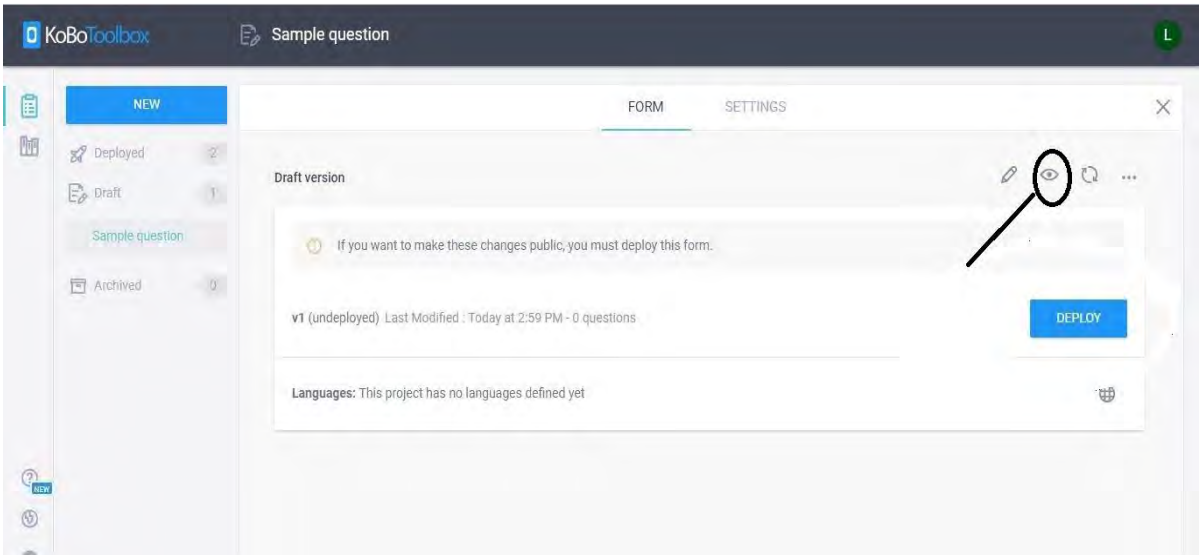


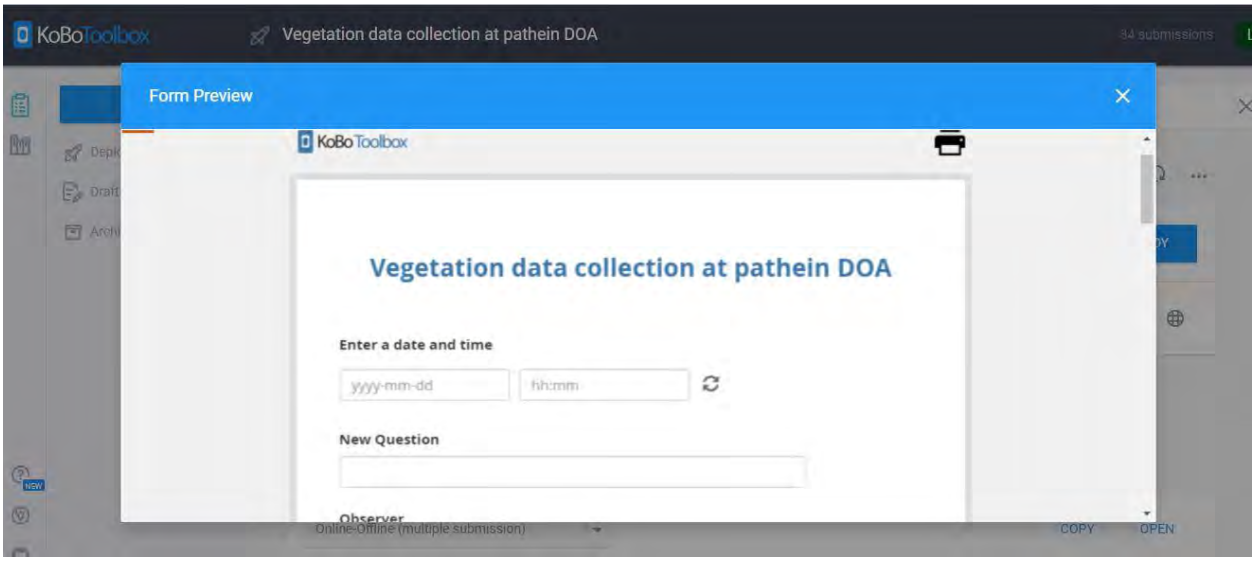


Alternatively choose "**Upload an XLSForm**" to upload questions already created or shared with you.

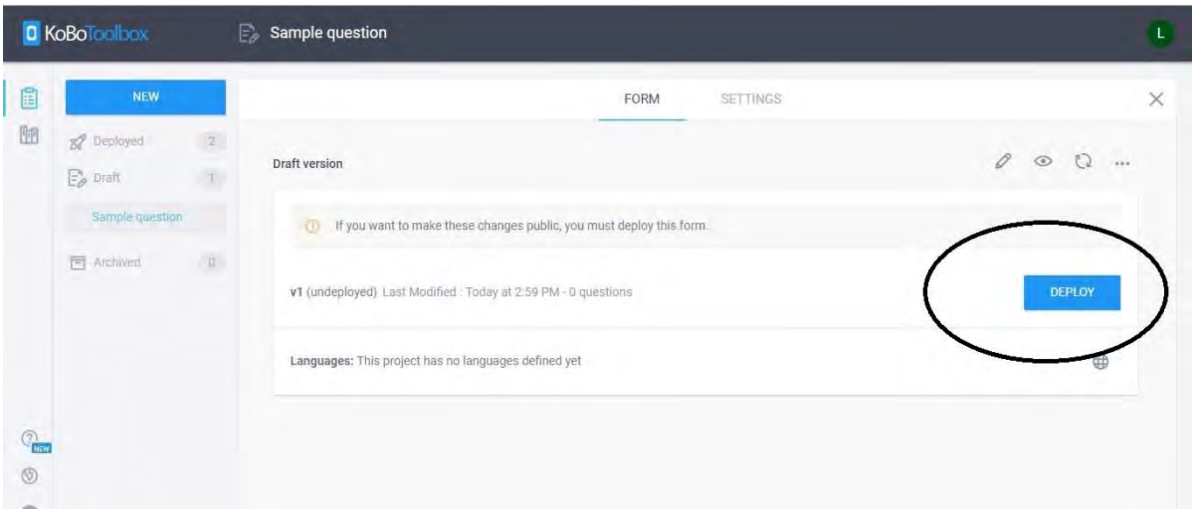


Click the "**preview**" button before deploying.



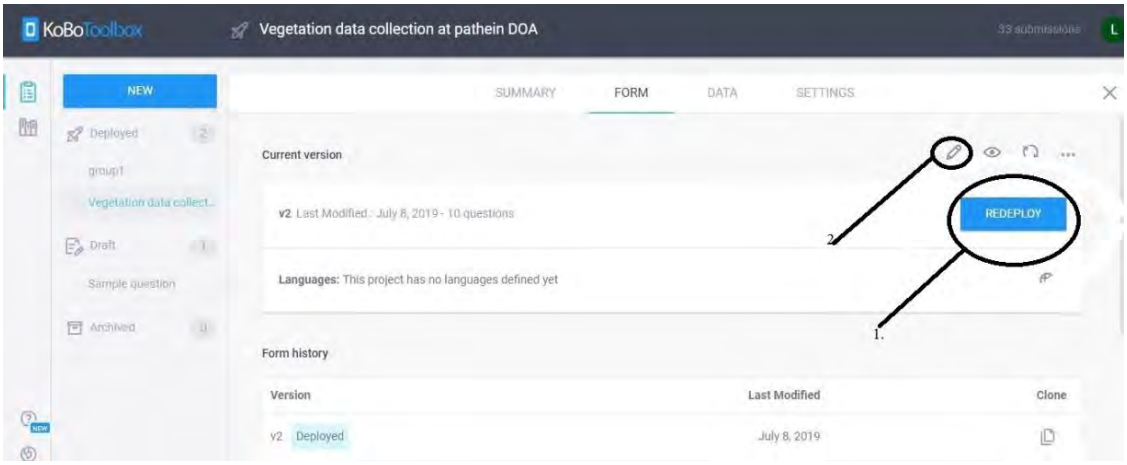


Then ***deploy*** the created question in order to use this question in Kobo collect.



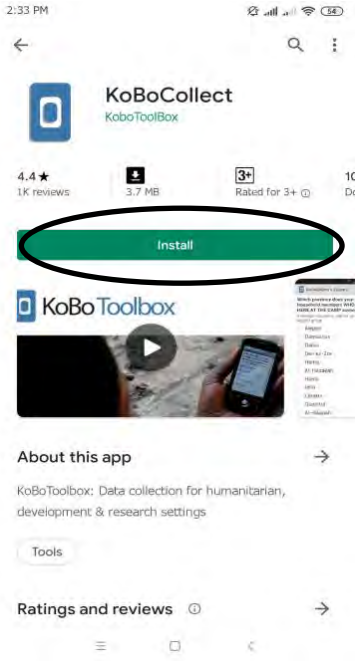
11. Editing the question form in Kobo Toolbox

When you edit the question form, you need to redeploy. Edit the form as you want then hit the redeploy button.

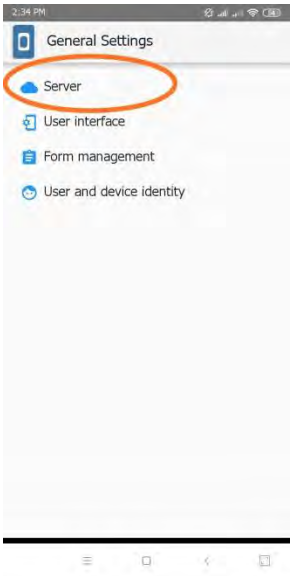


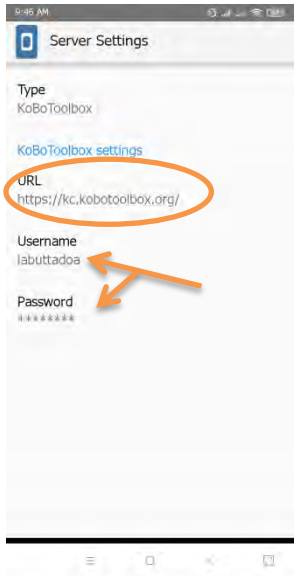
12. Use of Kobo Collect for data collection

In order to collect data we need to install the data collection app on our data collection device (for example: mobile phone or tablet). Go to the Google playstore and install "**Kobo Collect**".

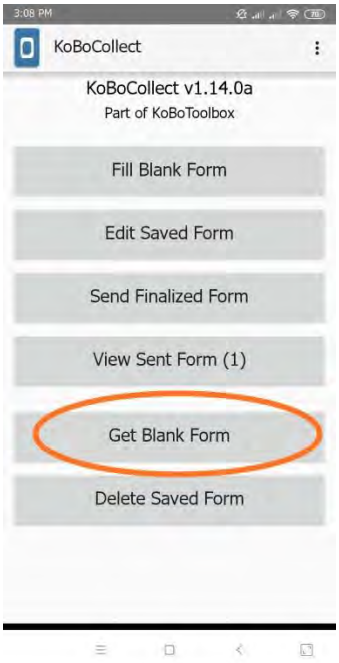


Click the three dots at the top and choose "**General Setting**". Then click "**Server**". Revise the **URL** to "https://kc.kobotoolbos.org/". Then add **Username** and **Password** there.

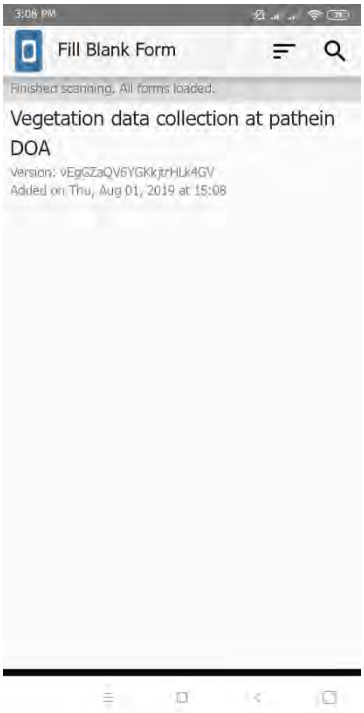




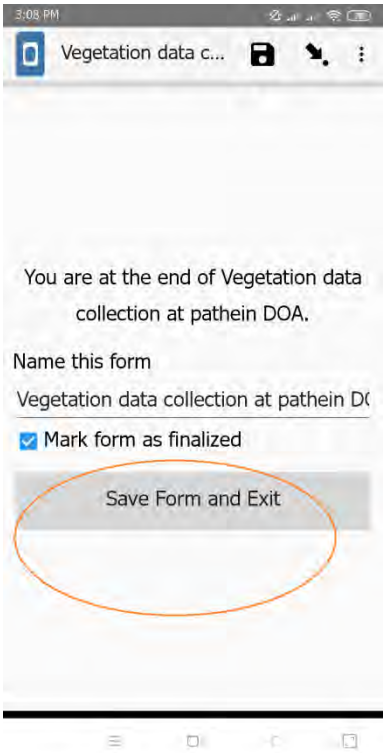
To get the question created in Kobo Toolbox account, click "**Get Blank Form**" and then select the question that we wanted to download before clicking "**Get Selected**".

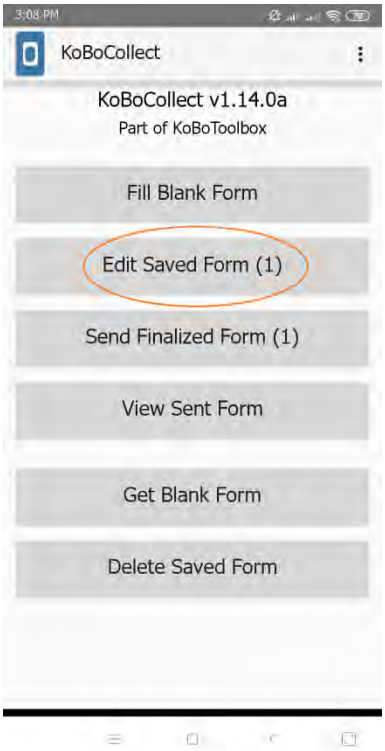


To collect the data via Kobo Collect, go to "**Fill Blank Form**" and select the question form we downloaded.



After collecting the data, click "**Save Form and Exit**". We can review and edit the filled question form in "**Edit Saved Form**".





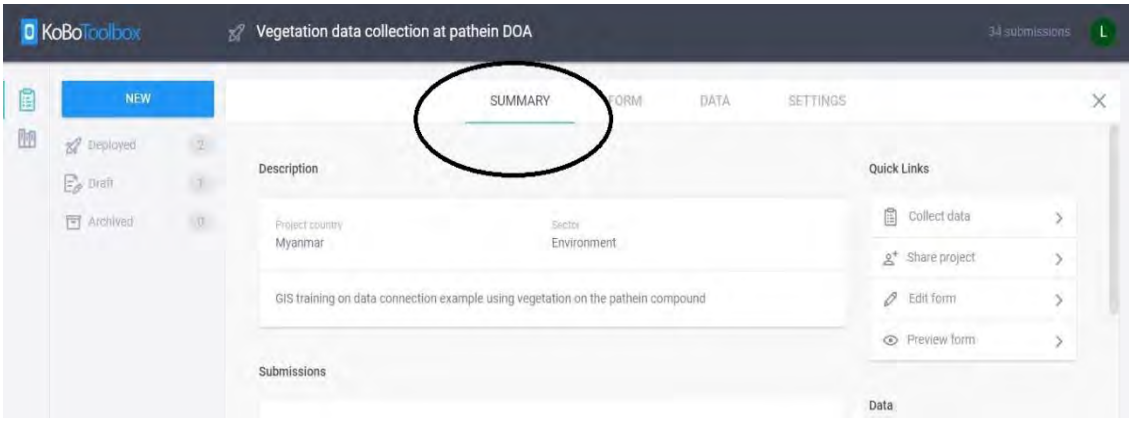
If there is nothing to change the form, click "**Send Finalized Form**". Select the form we want to send to Kobo Toolbox account and click "**Send Selected**". We can check whether the form is sent or not by clicking the button called "**View Sent Form**".

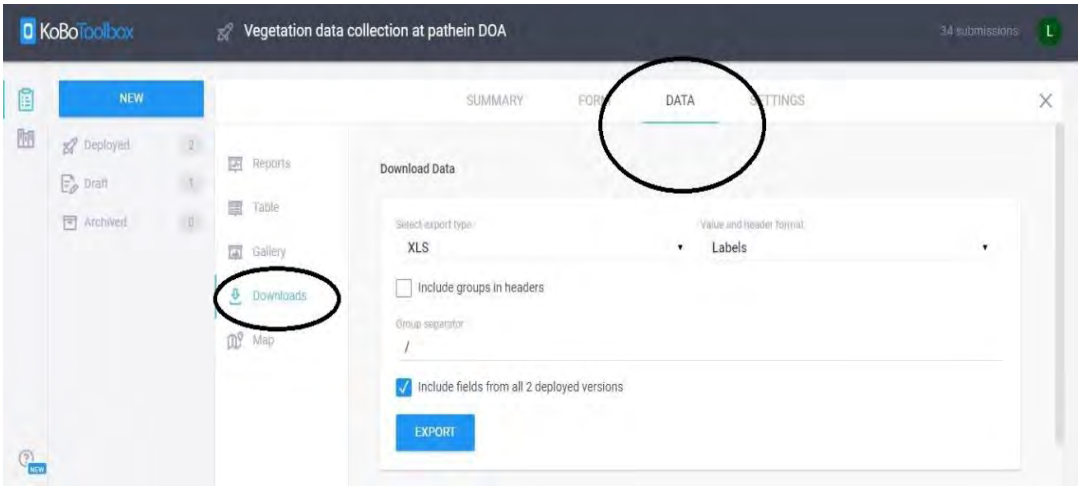
10:03 AM
Send Finalized Fo...
Finished scanning.
Vegetation data collection at pathein DOA
Finalized on Fri, Aug 02, 2019 at 09:37
Clear All
Send Selected

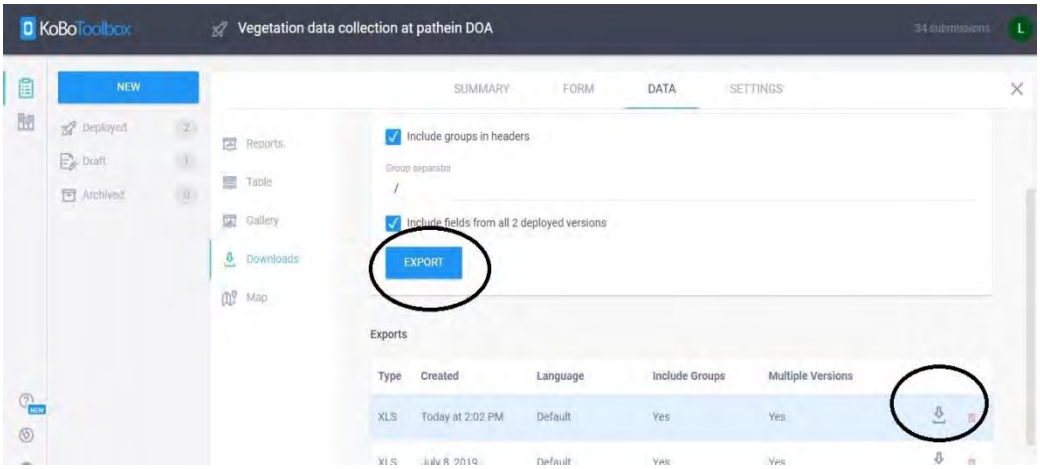
3:08 PM
KoBoCollect
KoBoCollect v1.14.0a
Part of KoBoToolbox
Fill Blank Form
Edit Saved Form
Send Finalized Form
View Sent Form (1)
Get Blank Form
Delete Saved Form

13. *Checking and Downloading data collected by KoboCollect application in KoboToolbox account*

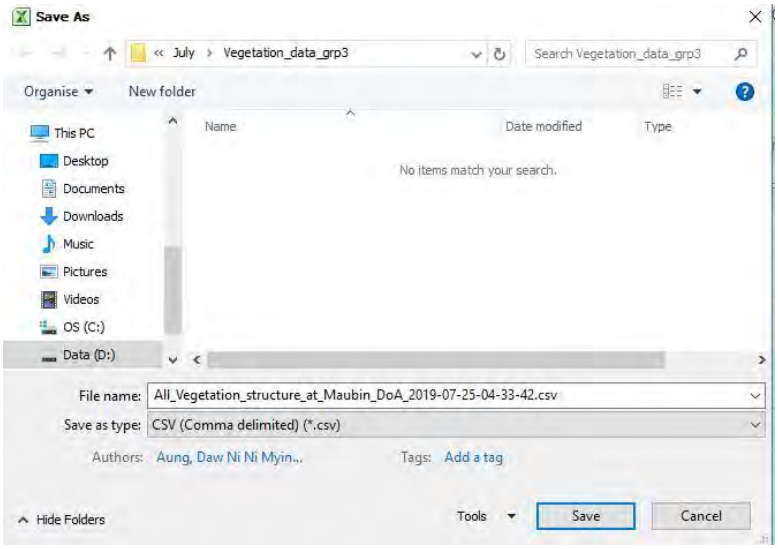
Logon the KoboToolbox account. Then click the icon and we can see the number of filled question forms. When we click on the question forms, we can look at a "**Summary**" of our data collected. Then we click "**Data**" and "**Download**". After that, tick "**Include groups in headers**". Then click "**Export**". Finally, click the down arrow icon " ".







After downloading the data, save the data from "**.xls**" format to a "**.csv**" format as shown below.

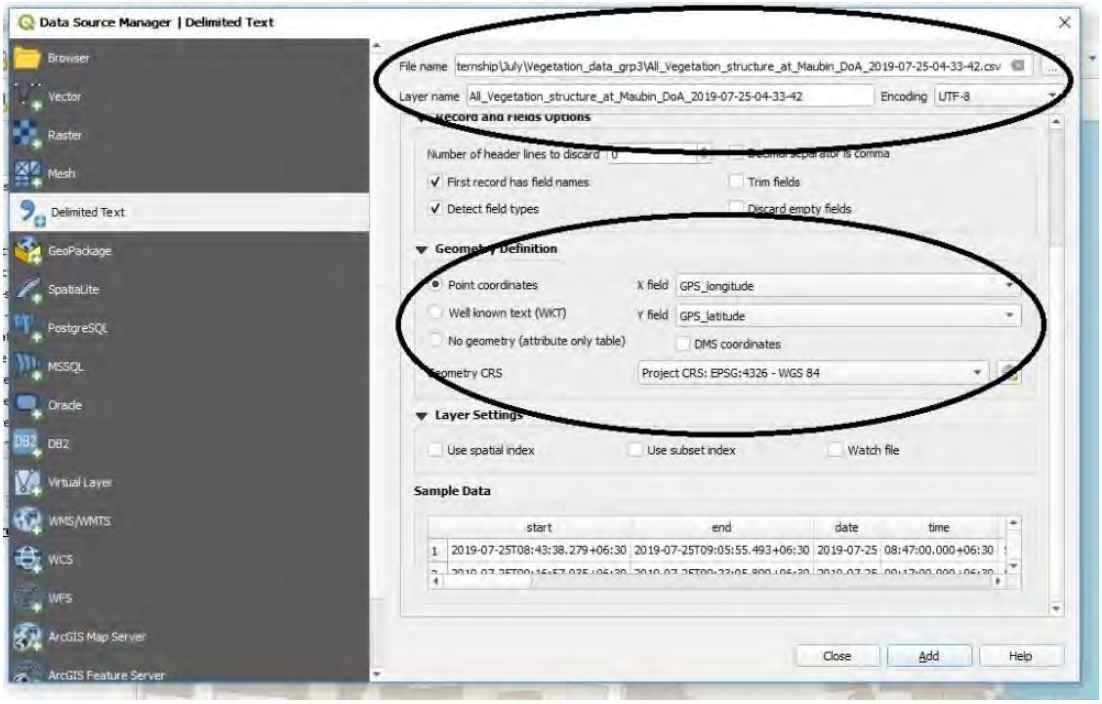


14. Visualizing data collected by KoboToolbox in QGIS

After changing the format to "**.csv**", open QGIS software. Click "**Layer**" in the menu bar. Select "**Add Layer**". Then choose "**Add Delimited Text Layer**".

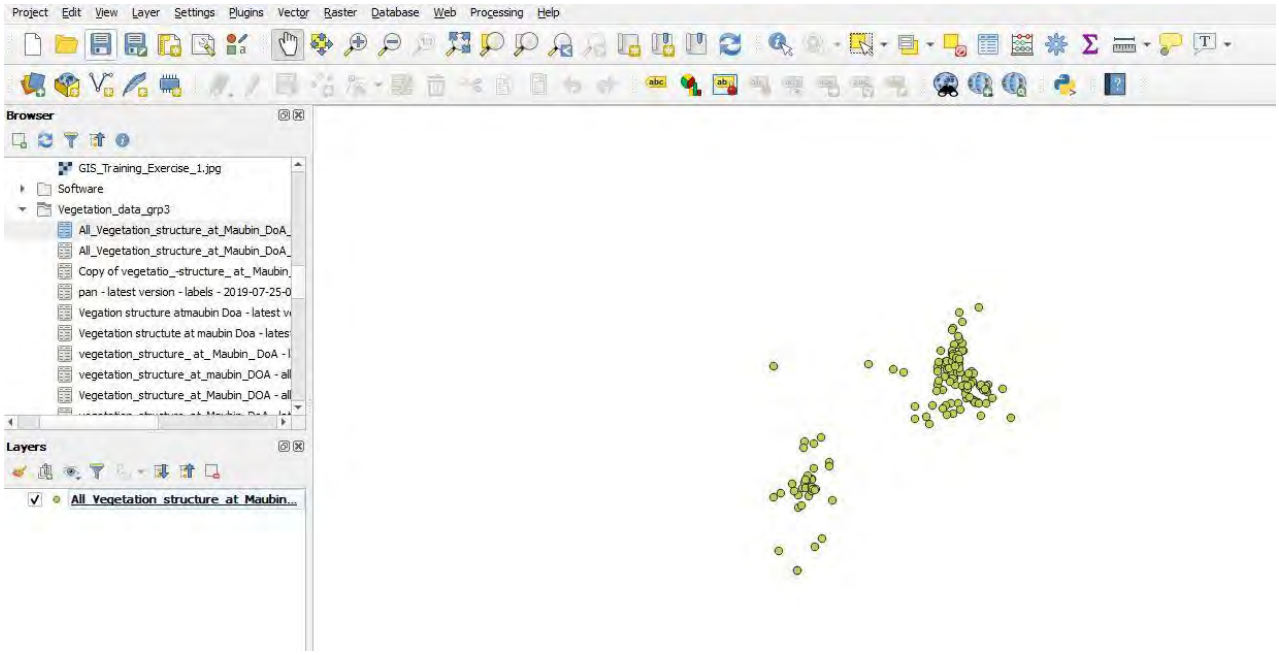
Ensure that the following are filled as shown in the image below:

a. Give the layer a name
b. Make sure "First record has field names" is checked
c. Under Geometry definition, point coordinates and make sure X field is the GPS longitude and Y field is the GPS latitude
d. Geometry CRS has WGS 84



Click **Add**.

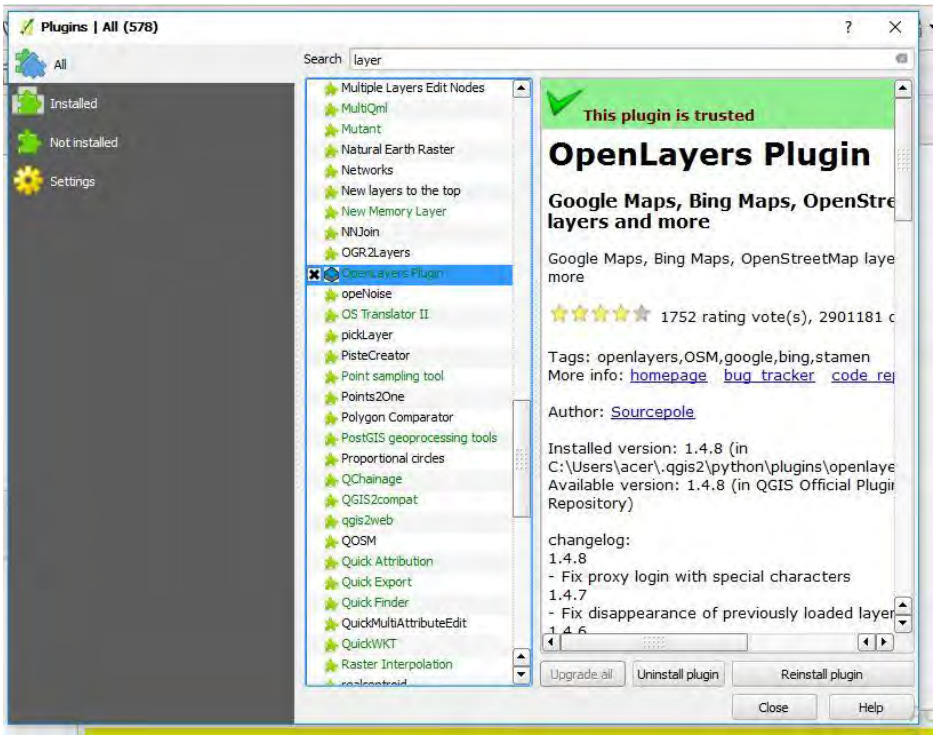
After adding the csv file, the data collected data location can be seen as below.


Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help
Browser
GIS_Training_Exercise_1.jpg
Software
Vegetation_data_grp3
All_Vegetation_structure_at_Maubin_DoA_
All_Vegetation_structure_at_Maubin_DoA_
Copy of vegetatio_-structure_ at_ Maubin_
pan - latest version - labels - 2019-07-25-0
Vegation structure atmaubin Doa - latest v
Vegetation structute at maubin Doa - lates
vegetation_structure_ at_ Maubin_ DoA - l
vegetation_structure_at_maubin_DOA - all
Vegetation_structure_at_Maubin_DOA - all
Layers
All_Vegetation_structure_at_Maubin...

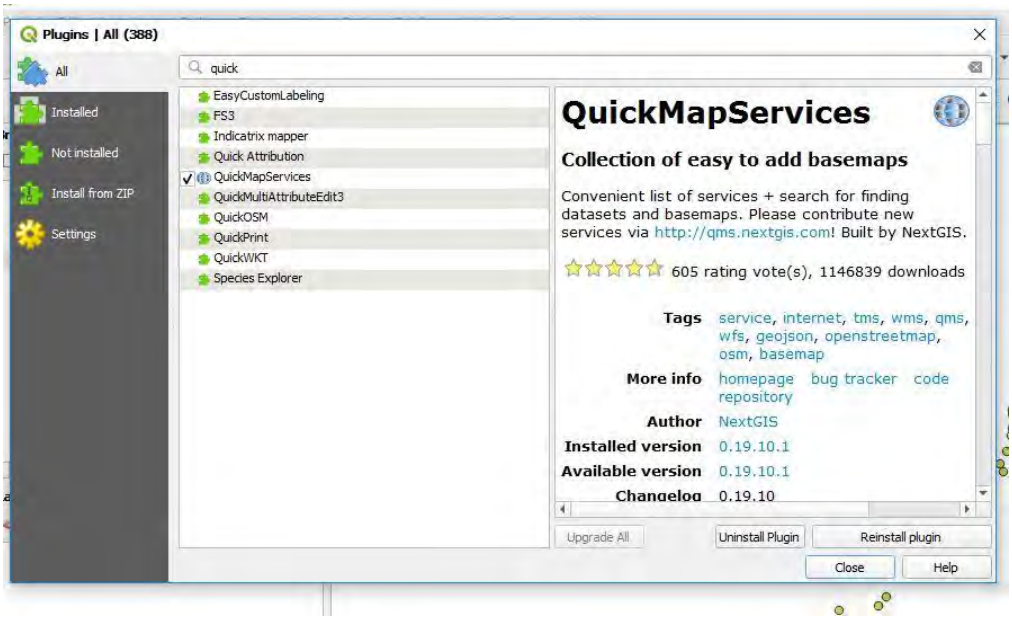
15. Adding a Background display:

We use the plugins to gain additional functionality to QGIS. Here we want to add a background display to our map. Click the ***Plugins*** button in the menu bar. Then choose "**Manage and Install Plugins**". Find "**Quickmap Service**" in the search box for *QGIS version 3*. Find "**Open Layer Plugins**" in the search box for *QGIS Version 2*.

Then click "**Install plugins**" Button.



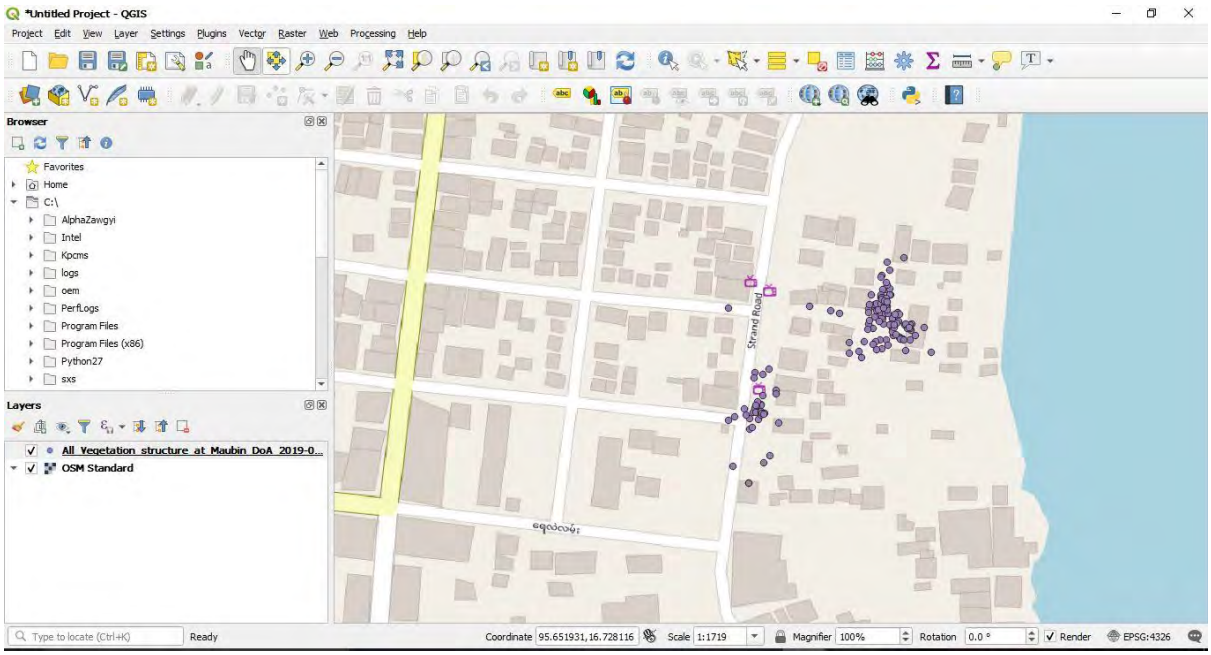
For QGIS Version 2



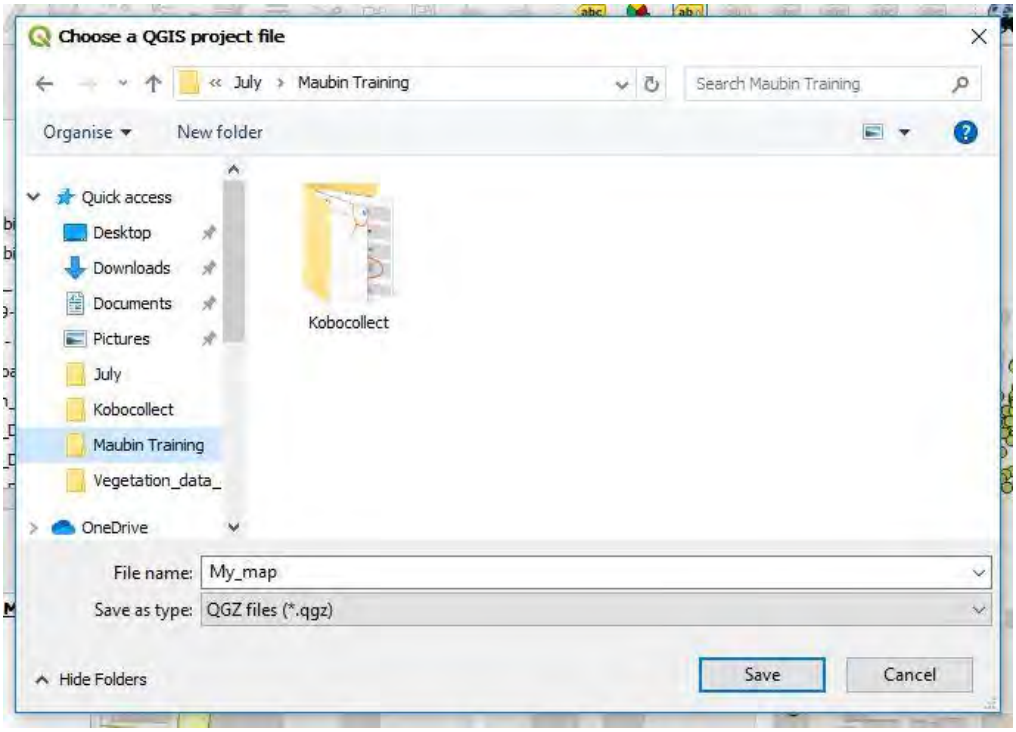
Once the plugins is installed, make sure that the check mark next to the plugin is checked.

For QGIS Version 3

To add "**Open Street Maps**" layer, click "**Web**" and then "**Quick Map Service**". Choose "**OSM Standard**". Then the map will change as below.

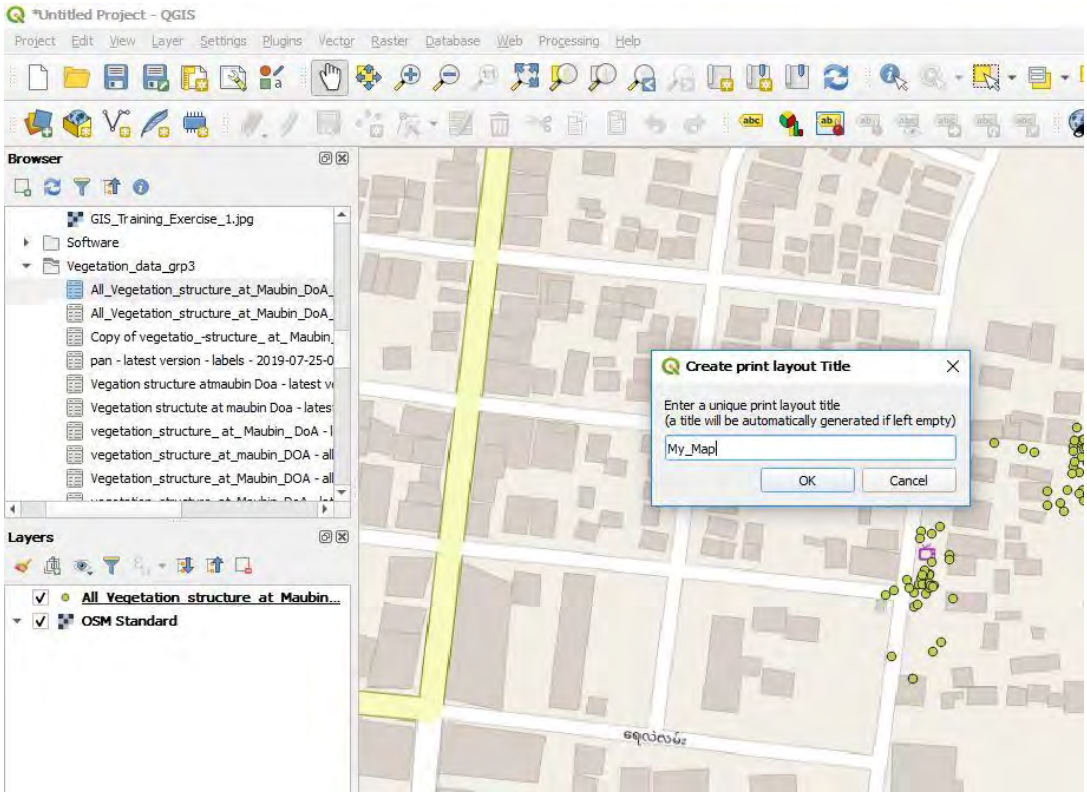


Finally click "**Project**" in the menu bar and "**Save**".

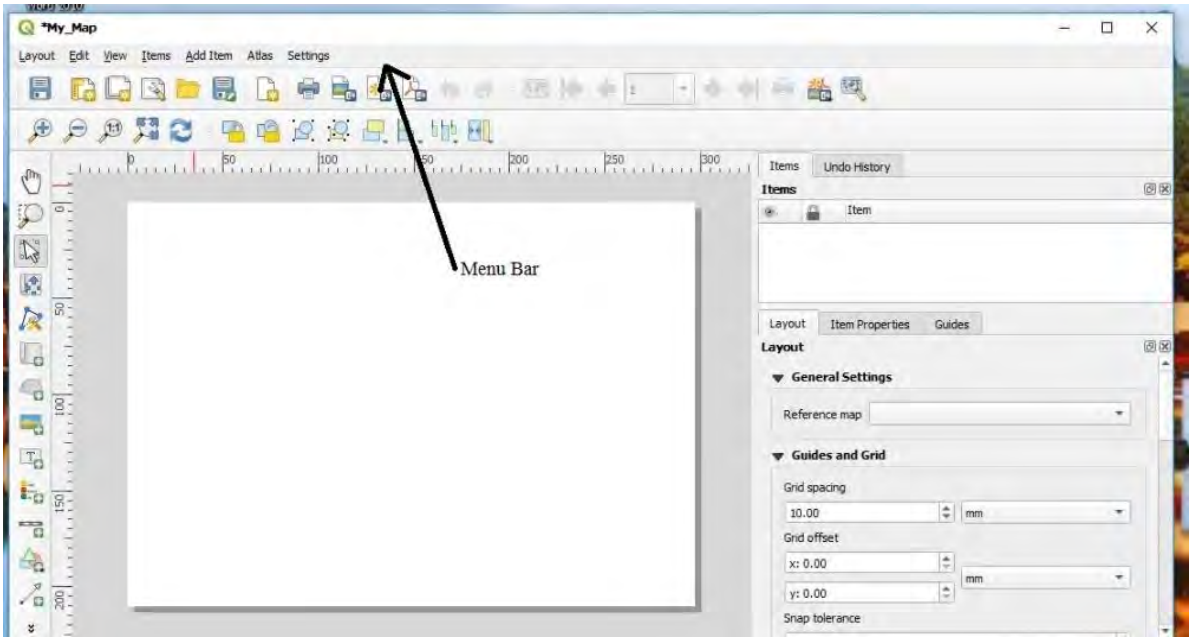


16. Creation of a ready to print map after adding the collected data

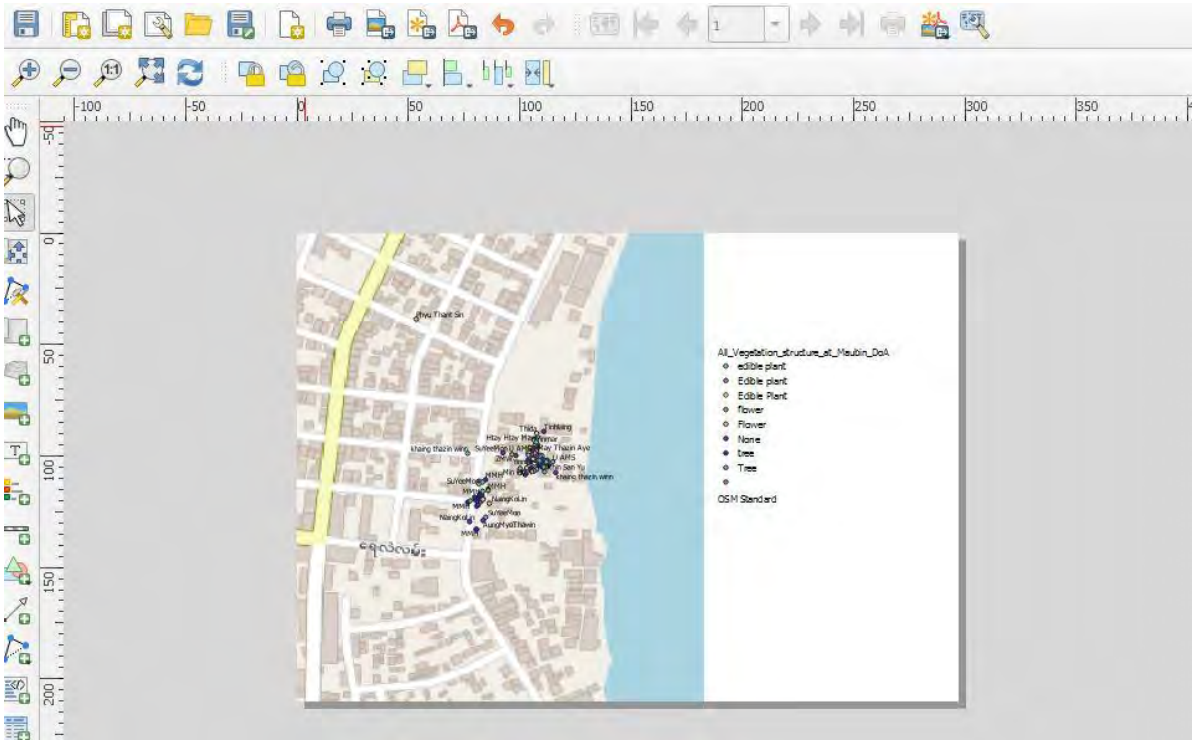
Go to "**Project**" Button in the menu bar. Then choose "**New Print Layout**".



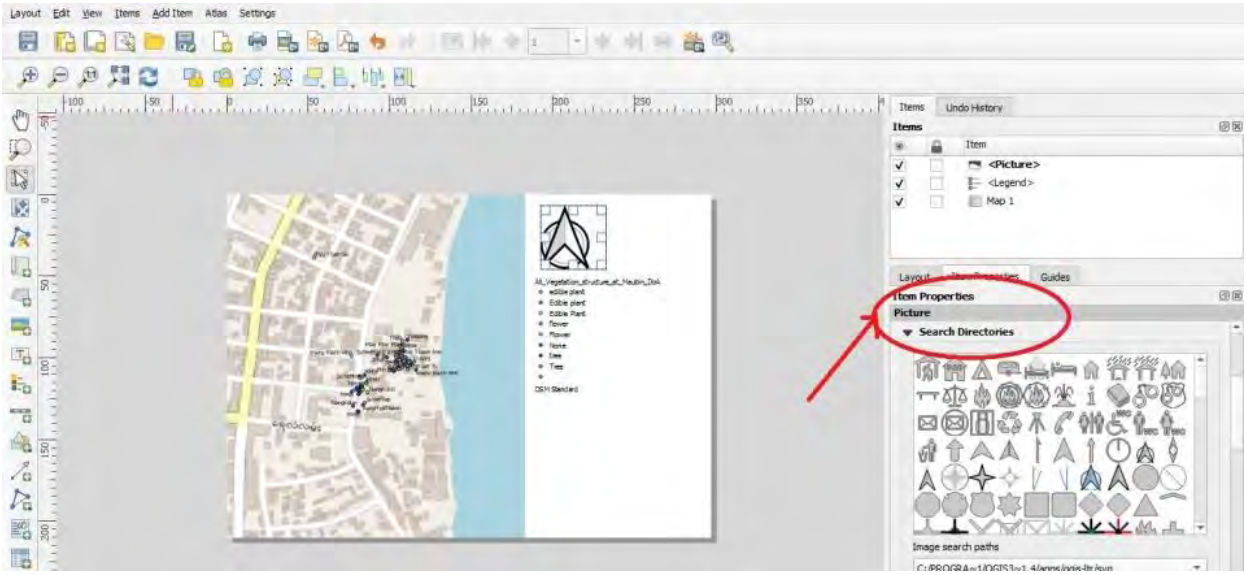
After giving a name, the new layout will appear.

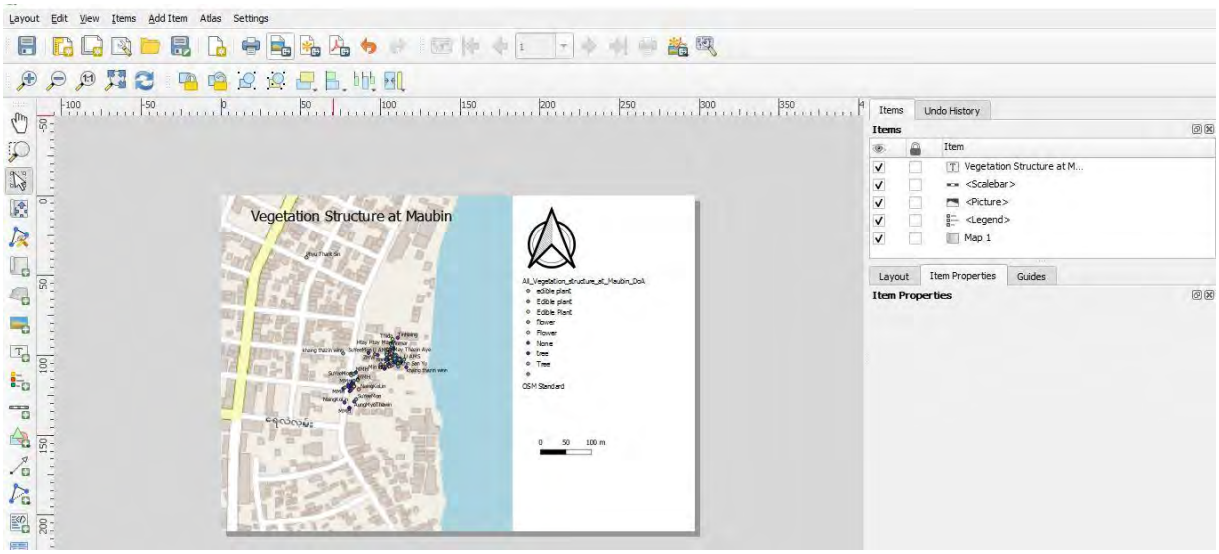


Click “**Add Item**” in the menu bar. Choose “**Add Map**”. Then drag the caser and place the map on the layout. To add label in the map, click “**Add Item**” and then click “**Add legend**”. Drag the caser and locate the label in the layout.



Click “**Add Item**” and choose “**Add Picture**”. Then click “**Search Directories**”. Find the north arrow logo.





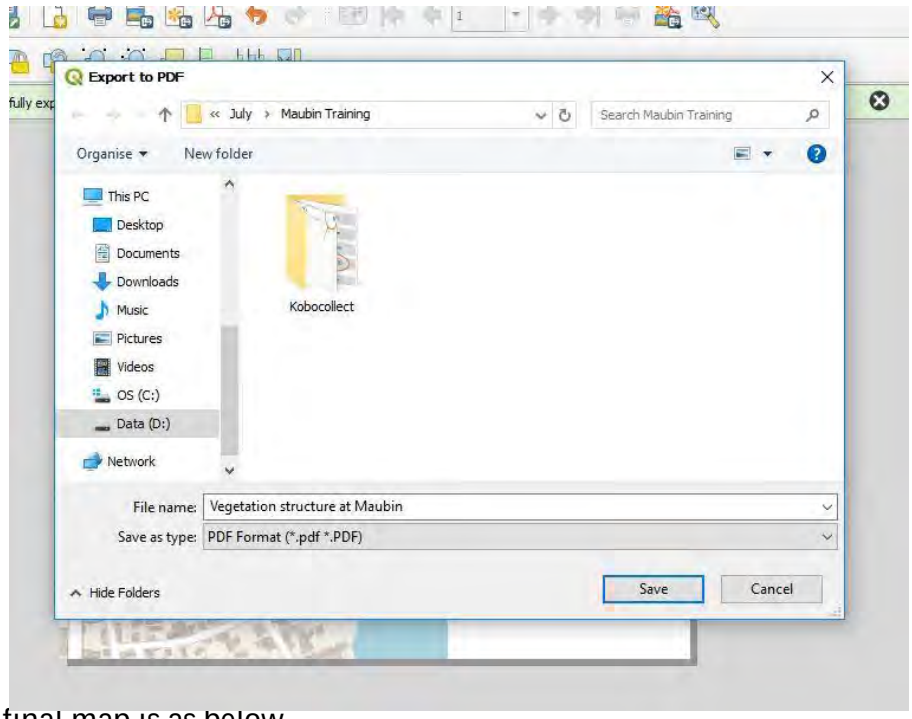
Click "**Add Item**" and choose "**Add Scale**". To add the title of the map, click "**Add Item**" and choose "**Add Label**".

After generating the map, we can export map in two formats: "**image format**" and "**pdf format.**

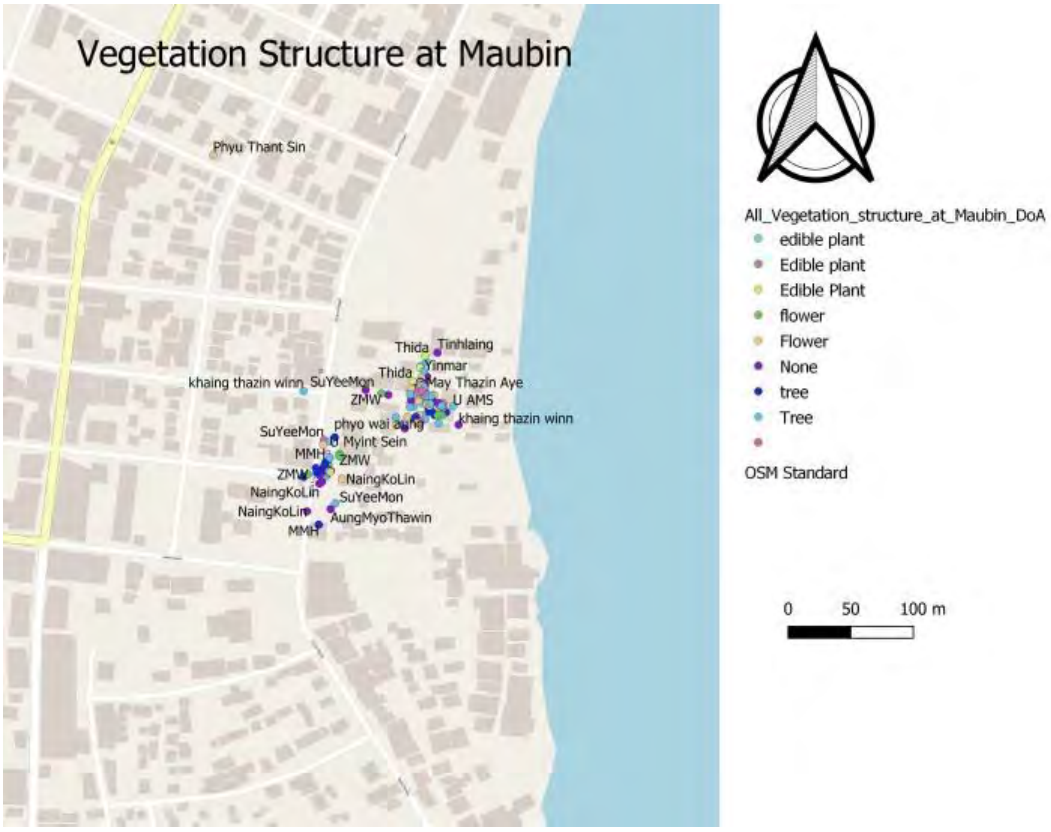
Click "**Layout**" button in the menu bar.

Click "**Export as image**" for image format.

For pdf format, click "Export as pdf". Then click "**Save**" button.



The final map is as below.


Vegetation Structure at Maubin
Phyu Thant Sin
Thida
Tinhlaing
Yinmar
Thida
May Thazin Aye
khaing thazin winn
SuYeeMon
ZMW
U AMS
phyo wai aung
khaing thazin winn
SuYeeMon
Myint Sein
MMH
ZMW
ZMW
NaingKoLin
NaingKoLin
SuYeeMon
NaingKoLin
AungMyoThawin
MMH
All_Vegetation_structure_at_Maubin_DoA
edible plant
Edible plant
Edible Plant
flower
Flower
None
tree
Tree
OSM Standard
0
50
100 m

17. Visualising suitability areas for various Flood-Based Farming Systems

During August 2018, the Kobotoolbox app was used to collect data on 3 rice farming systems - favourable rice land, flooded rice land and deepwater rice land. Each of these rice farming systems have different characteristics for flood, topography and location. The data collected was used to predict areas within the delta that would be suitable for the production of each of these rice types.

Definition used to map favourable rice land, flooded rice land and deepwater rice land environments.

Favourable rice land	- Large , flat areas - Typical water depth :15-30cm - Short flood duration : hours - High yielding variety grown during the summer
Flooded rice land	- smaller field sizes with some trees - water depth: 30-60 cm, flood duration: 1-2 weeks - traditional rice varieties
Deepwater rice land	- "bowl-shaped" topography - water depth is greater than 90 cm, flood duration: more than 3 months - deepwater rice varieties

To collect the data of favourable rice land, flooded rice land and deepwater rice land in Ayeyarwaddy Division, we created a question form in the Kobo Toolbox account.

fbfs_groundtruth _ KoboToolbox _ KoboToolbox.pdf

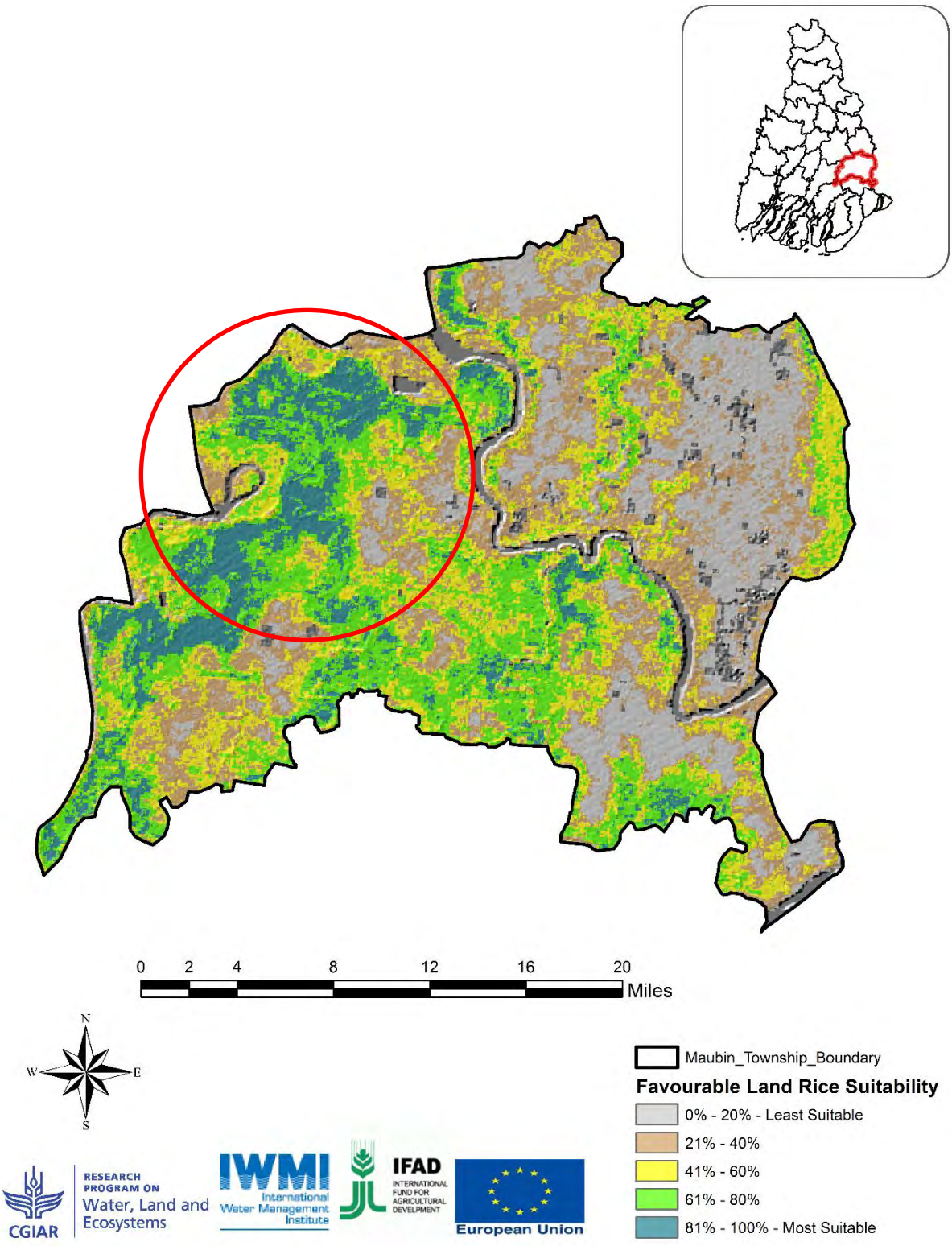
18. How to read rice suitability map practically

Using the rice suitability maps, we can visualize how suitable a given area is for the production of each of these rice varieties.

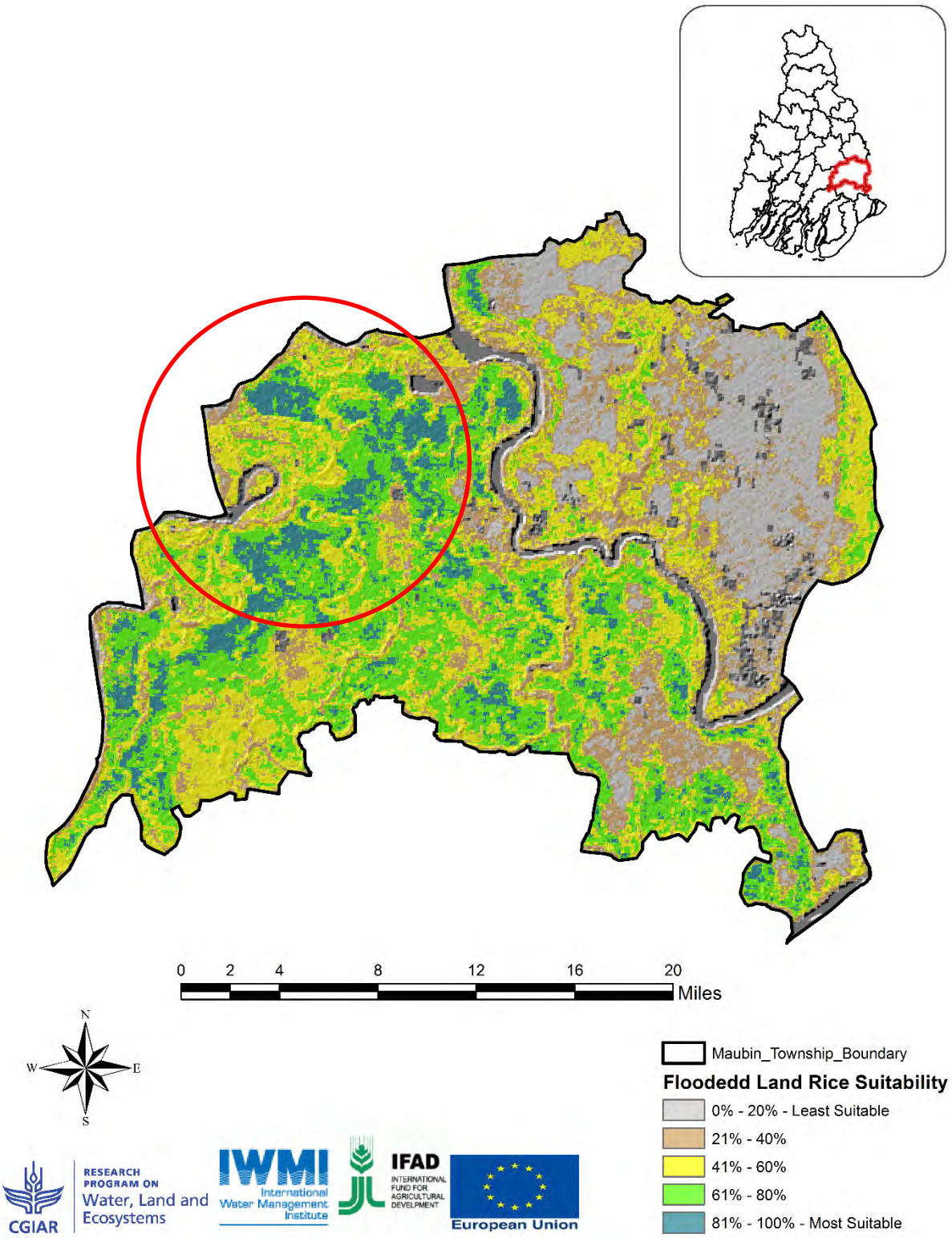
Three categories were used for the flood based farming system project: Favourable Rice Land, Flooded Rice Land and Deep Water Land.

The rice suitability maps of Maubin are shown below. These maps have different patterns that show the different suitability for rice varaiety. In the map, areas of high suitability (81-100%) are colored in blue while areas of low suitability (0%-20%) are colored in grey.

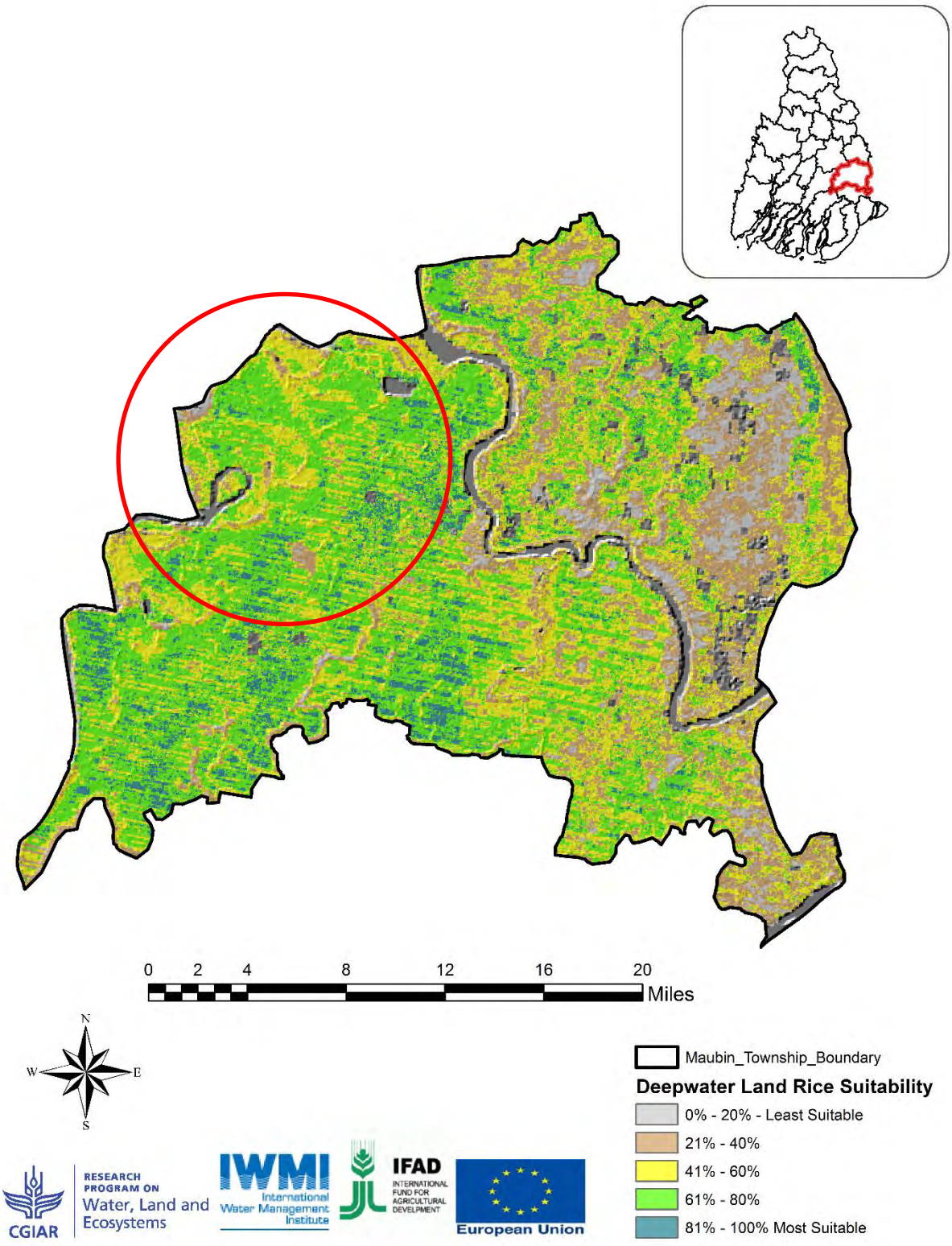
A look at the circled areas highlighted in the map shows the variability in suitability for production for each of the rice varieties at this location. Although there is high potential of favourable rice land and flooded rice land in the circled area, there is less suitability of deepwater rice land.



Favourable Rice Land suitability map for Maubin township.



Flooded Rice Land suitability map for Maubin township



Deepwater Rice Land suitability map for Maubin township

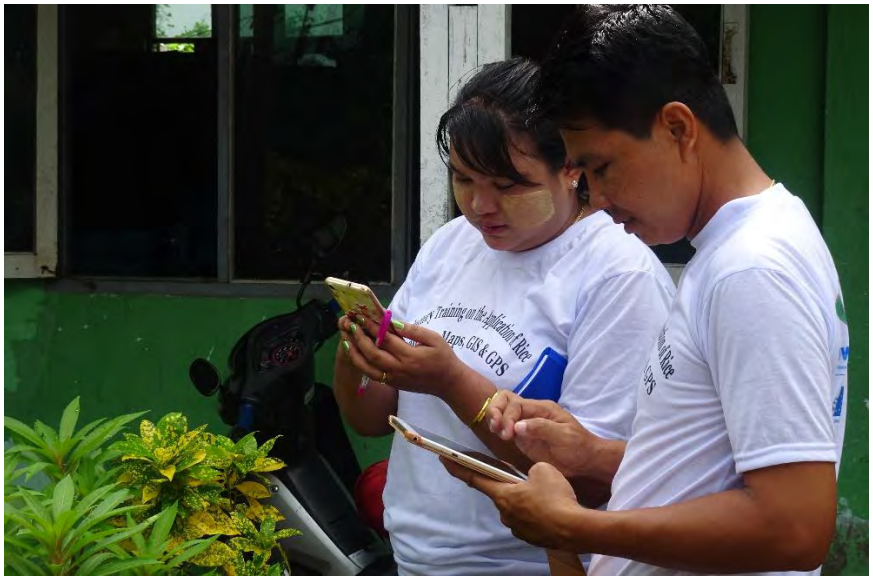
Introductory Training on Rice and Rice-Fish Suitability Mapping, GIS and GPS in Ayeyarwady Division during 6 – 25 July 2019

DOA

What is GIS?

IWMI
CGIAR
The Opening Ceremony of the
Introductory Training on Rice Suitability Maps,
A collaboration between
Department of Agriculture and International Wate
Institute
IFAD

INFORMING SPATIAL PLANNING
Rice suitability mapping
Consider 5 rice environments:



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