

Accuracy Assessment, & Uncertainty Assessment

**Presented by Lanieta Rokotuiwakaya
Project Officer Forest Degradation
SPC GEM**

Overview

Training provided by consultant

Assessments measures accuracy of classification

Methods provides way for self control interpretation accuracy

Purpose

Identification and measurement of map errors, such as:

- **Positional accuracy**
- **Geometric error**
- **In-complete atmospheric correction**
- **Incorrectly labelling after unsupervised classification**
- **Incorrectly labeled training sites before supervised classification**

To determine uncertainties in area measurements

Benefits

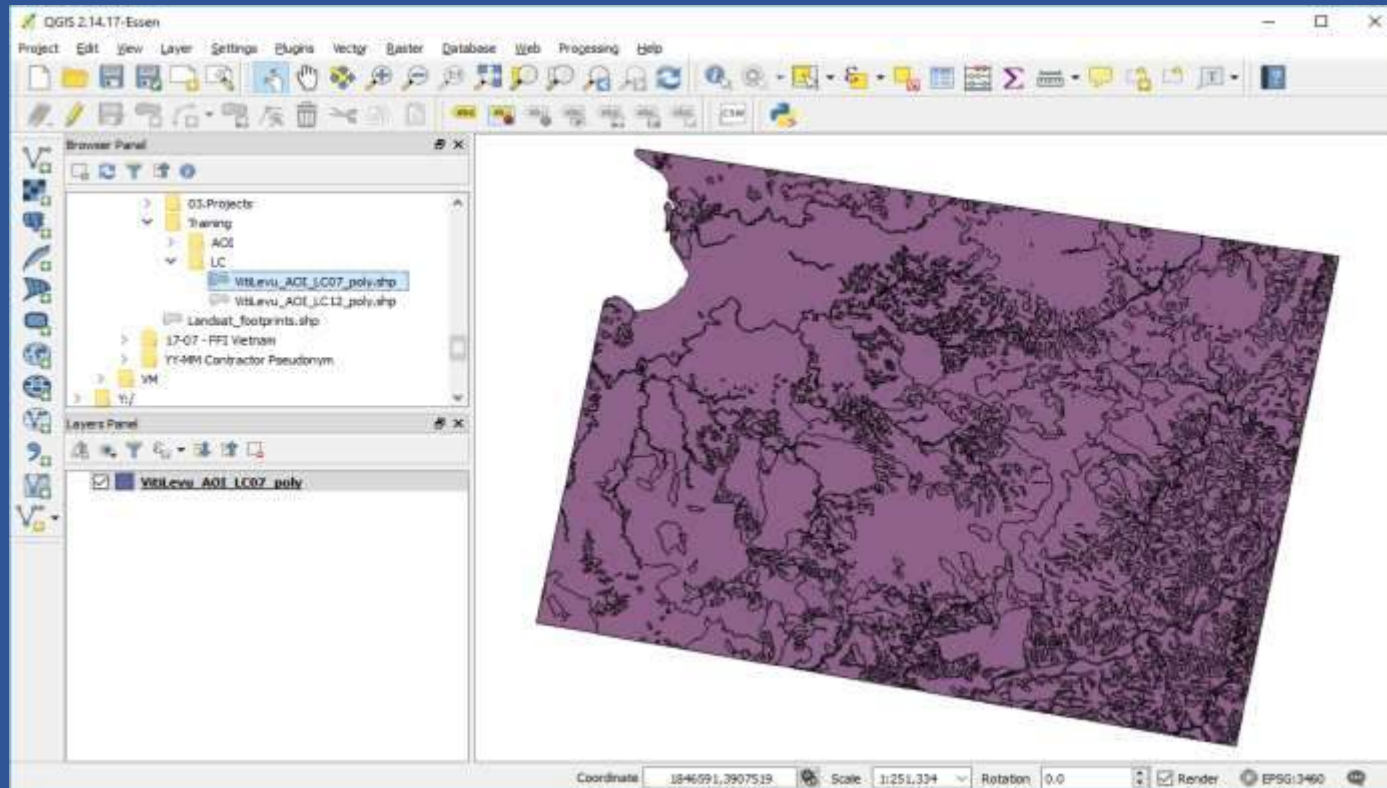
- **Potential to assess own work**
- **Methods will be used by an independent party**

Reference data

- **Software used:**
QGIS, Microsoft Excel
- **Datasets used:**
- **VitiLevu_AOI_LC07_poly.shp: Land cover classification of a subset of Viti Levu from the year 2007**
- **LE70750722007187EDC00_stack_AOI.tif: Landsat-7 ETM+ image from 2007**
- **LE70750722007283EDC00_stack_AOI.tif: Landsat-7 ETM+ image from 2007**

Steps Carried Out

- ***Load land cover shapefile into QGIS:***



Generate stratified random sample dataset

Convert shapefile to multipart shapefile: Vector → Geometry Tools → Singleparts to Multipart

The screenshot shows the QGIS 2.14.17-Essen interface. The 'Geometry Tools' menu is open, with 'Singleparts to Multipart...' selected. The 'Singleparts to multipart' dialog box is open, showing the following settings:

- Input line or polygon vector layer: Vitilevu_AOI_LC07_poly
- Unique ID field: Class
- Output shapefile: /w/ltbank Fiji/02.Vector/LUC/vitilevu_LC_07_poly_mp.shp
- Add result to canvas

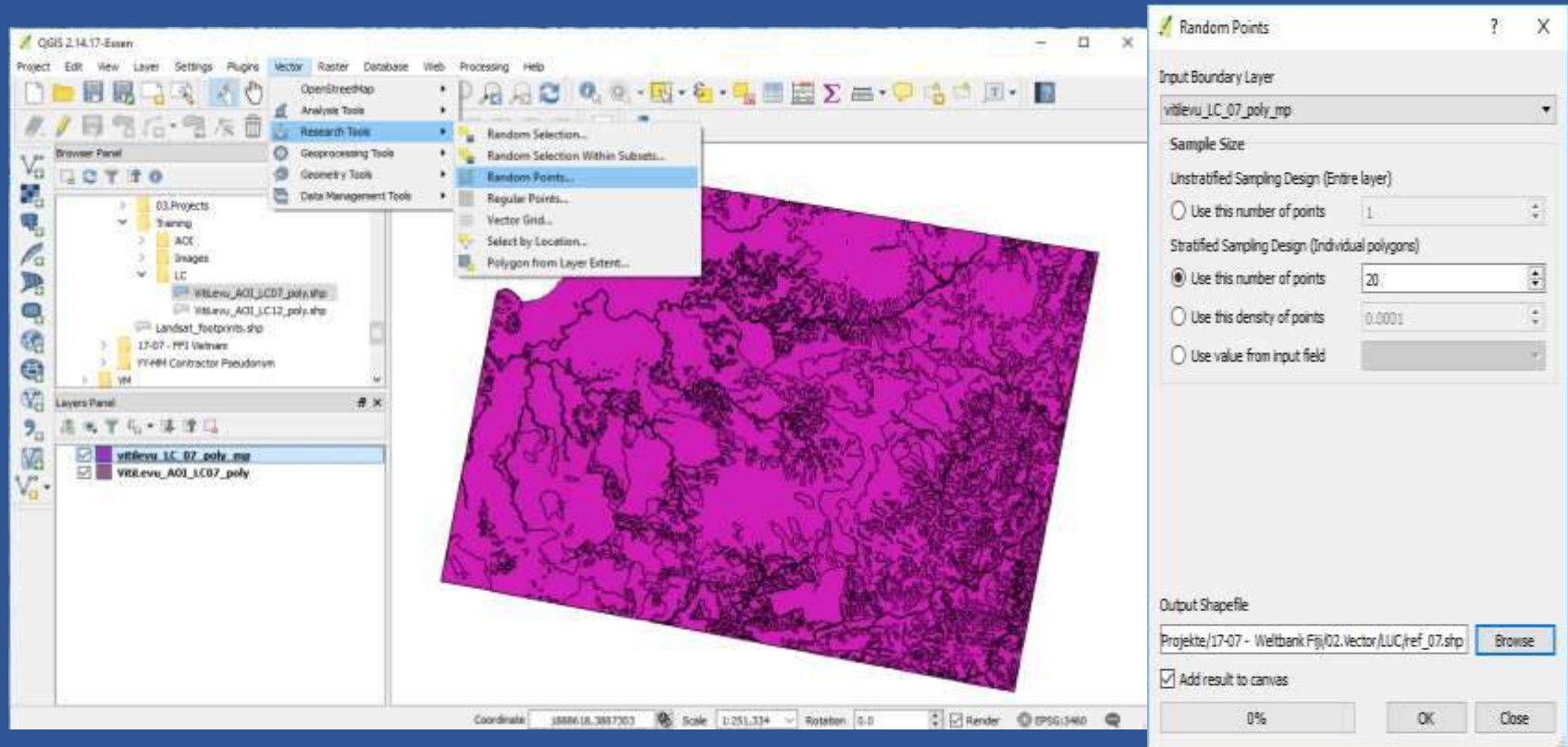
The background shows a map of land use data. A table window titled 'vitilevu_LC_07_poly_mp' displays the following data:

Id	gridcode	Class
0	7824	4 Mahogany Planta...
1	4586	2 Mangrove
2	4665	1 Natural Forest
3	4743	7 Non-Forest
4	5868	3 Pine Plantation
5	4757	6 Water body

Output: Polygons with same class are aggregated

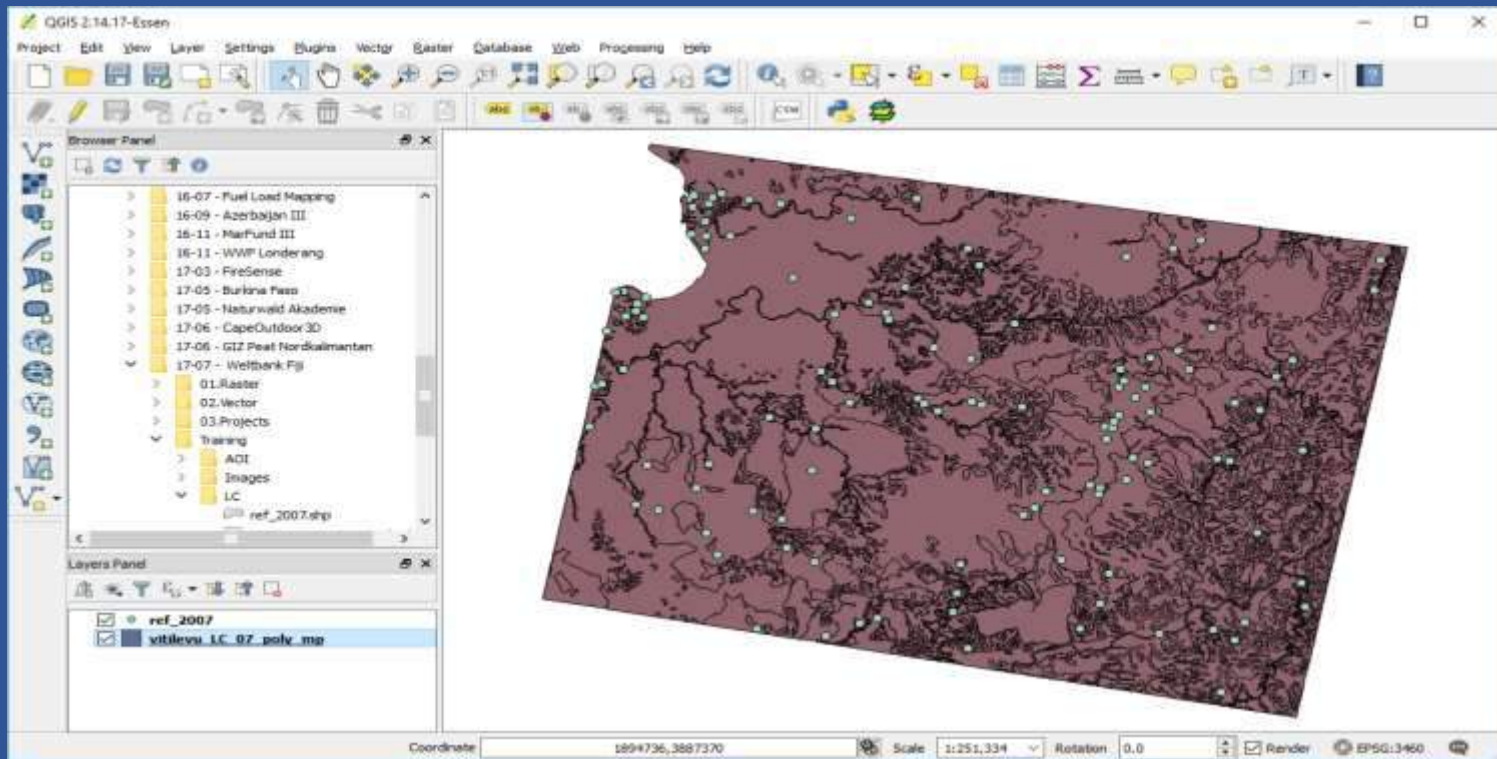
Stratified random sample points

- **Vector** → **Research Tools** → **Random Points**



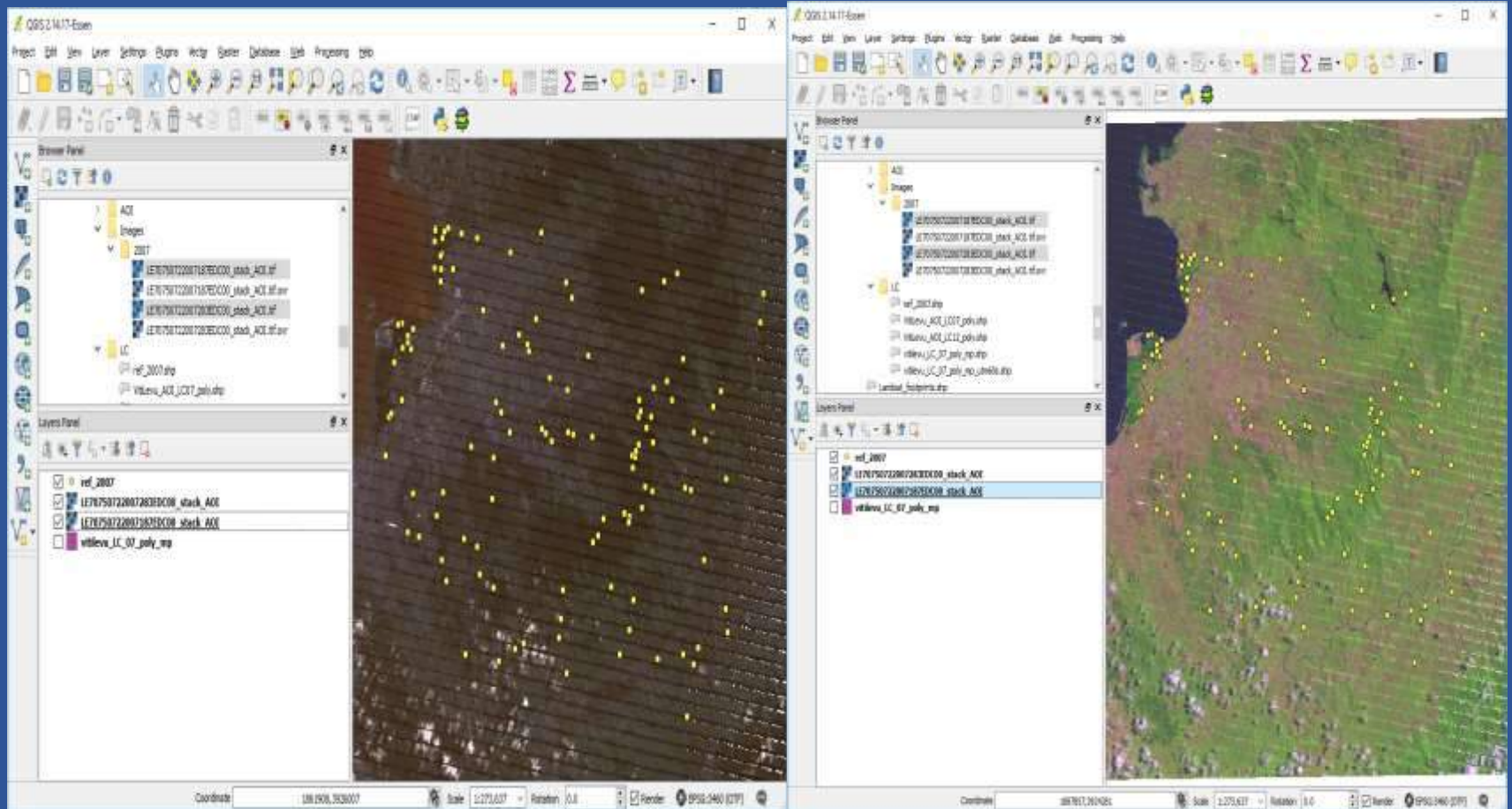
Result: Point vector layer with 20 points in each land cover class

Point vector layer

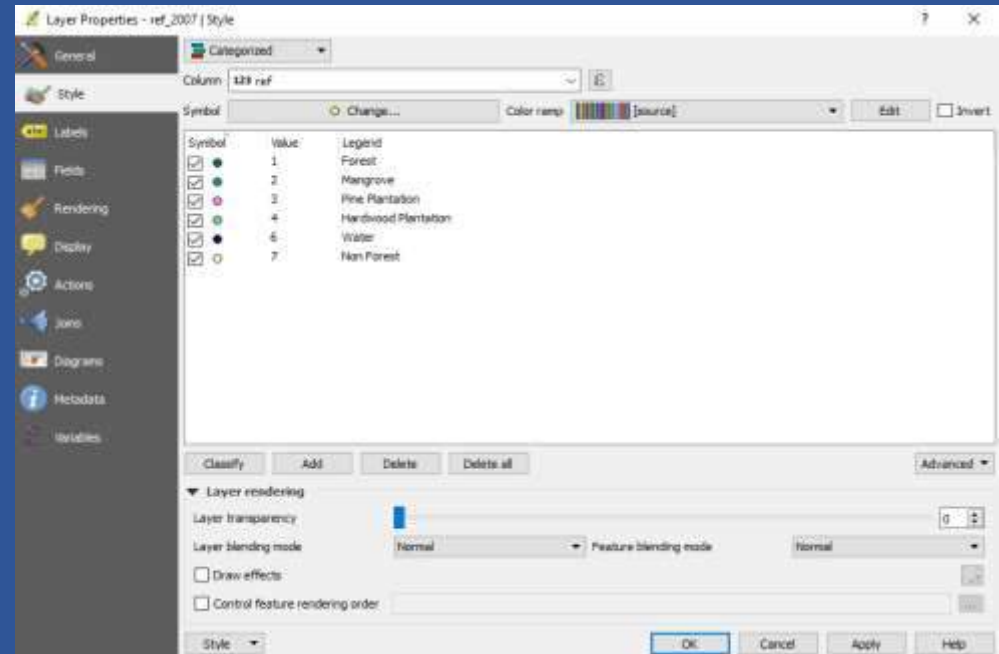
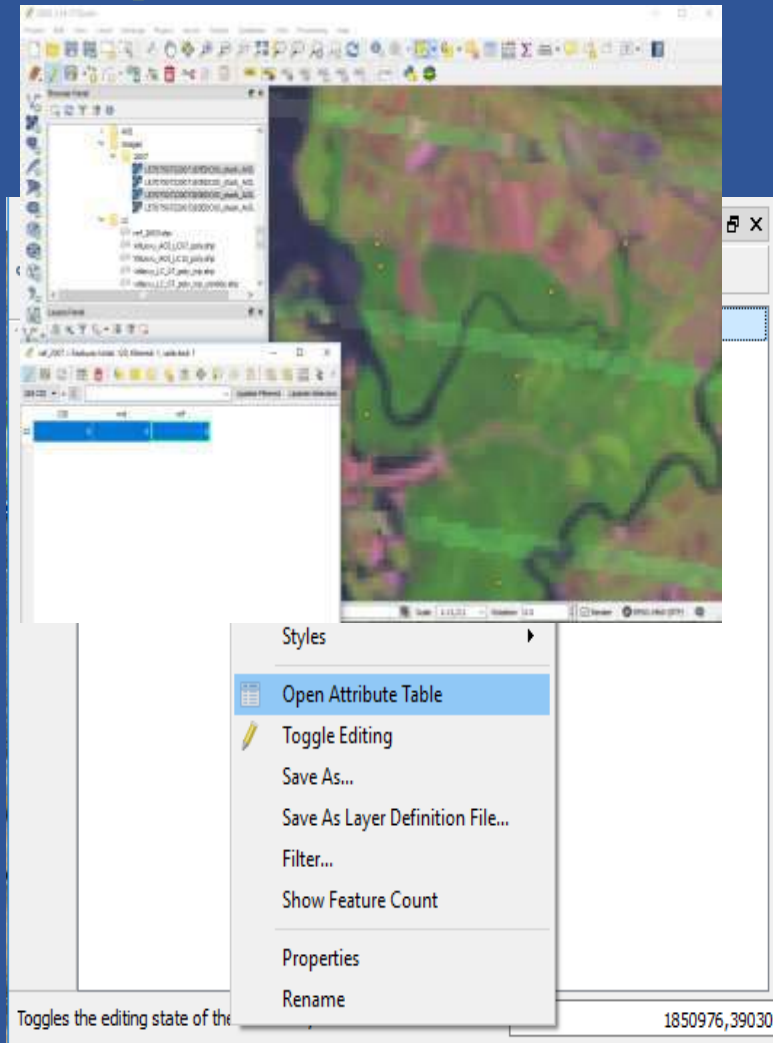


NOTE: Sometimes, the random points tool in QGIS takes very long for generating the points, or gets stuck. We tested it with Version 2.2, 2.10, 2.14, and 2.18. In case that the generation of random points fails, please generate in ArcGIS or a different GIS software.

Assign reference class to random points

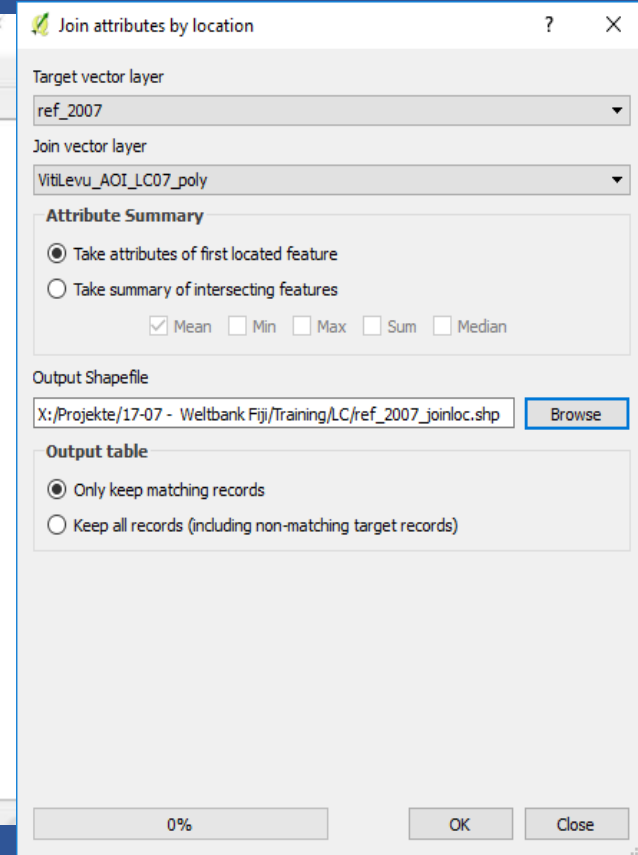
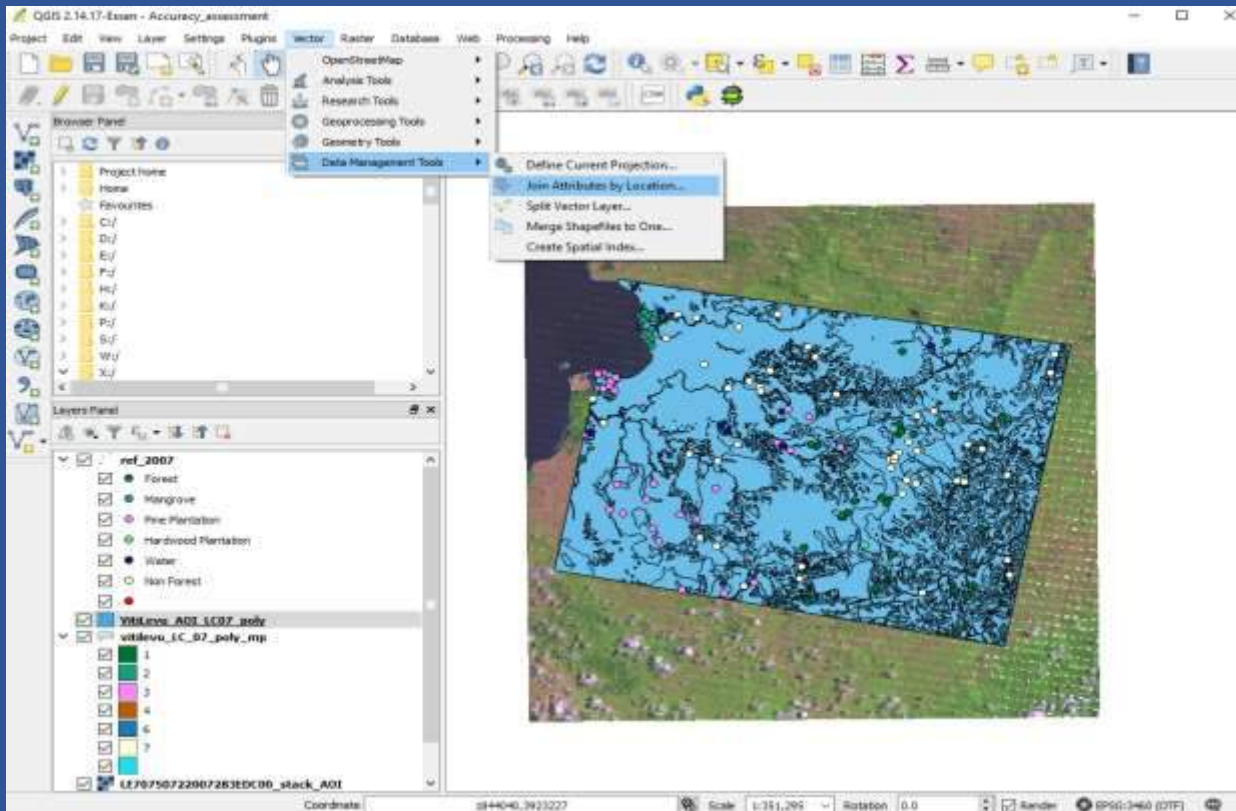


Open attribute table of Reference point dataset:



When all sample points have the reference class assigned, the class from the land cover map needs to be extracted:

- **Vector → Data Management Tools → Join attributes by location**
- **BE CAREFUL!** In order to assure that Join attributes by location works correctly, make sure that you use the singlepart version of the Land cover map. The tool will not work correctly with multipart features.



Output: Attribute Table with reference and map (gridcode) information

Calculations

- For more convenient editing and calculations, please copy values of Pivot table into a new Sheet:

Count of agre	Column Labels							
Row Labels	1	2	3	4	6	7 (blank)	Grand Tot:	
1	14		1			5	20	
2		20					20	
3			16		1	3	20	
4	4			15		1	20	
6	2		2		9	7	20	
7	4		1		1	14	20	
(blank)								
Grand Total	24	20	20	15	11	30	120	

- Delete blank columns; Format table (Make headings bold, row and column sums bold, Diagonal cells bold)

Count of agre	Column Labels							
Row Labels	1	2	3	4	6	7	Grand Total	
1	14		1			5	20	
2		20					20	
3			16		1	3	20	
4	4			15		1	20	
6	2		2		9	7	20	
7	4		1		1	14	20	
Grand Total	24	20	20	15	11	30	120	

- Calculate the Producer's Accuracies, the User's Accuracies and the Overall Accuracy as shown in the example below. Do not forget which Class code stands for which land cover class.

Class	Producer's accuracy	User's accuracy
1 – Forest	14/24 = 58%	14/20 = 70%
2 – Mangrove	20/20 = 100%	20/20 = 100%
3 – Pine Plantation	16/20 = 80%	16/20 = 80%
4 – Hardwood Plantation	15/15 = 100 %	15/20 = 75%
6 – Water	9/11 = 82 %	9/20 = 45%
7 – Non-forest	14/30 = 47%	14/20 = 70%

Overall accuracy: $(14+20+16+15+9+14) / 120 = 73\%$

- Producer's accuracy corresponds to the Error of Omission (100% - Producer's Acc), User's accuracy corresponds to the Error of Commission (100% - User's acc).

Accuracy assessment for Forest Change classifications

Class	Error of omission	Error of Commission
1 – Forest	42%	30%
2 – Mangrove	0%	0%
3 – Pine Plantation	20%	20%
4 – Hardwood Plantation	0%	25%
6 – Water	18%	55%
7 – Non-forest	53%	30%