



TUTORIAL: CHOROPLETH MAPS WITH EXCEL

This tutorial's aim is to show how to create a Choropleth map with Microsoft Excel. A choropleth map is a thematic map in which areas are shaded or patterned in proportion to the measurement of the statistical variable being displayed on the map, such as population density or per-capita income. *"The choropleth map provides an easy way to visualize how a measurement varies across a geographic area or it shows the level of variability within a region"* (Wikipedia). Excel choropleth maps can be an easy tool for non-advanced GIS users for regular updates of a specific situation in a given area (evolution of an epidemic for example). This tutorial shows how a GIS specialist can create an Excel mapping tools, that can then be managed independently by any user.

⚠ Requirements:

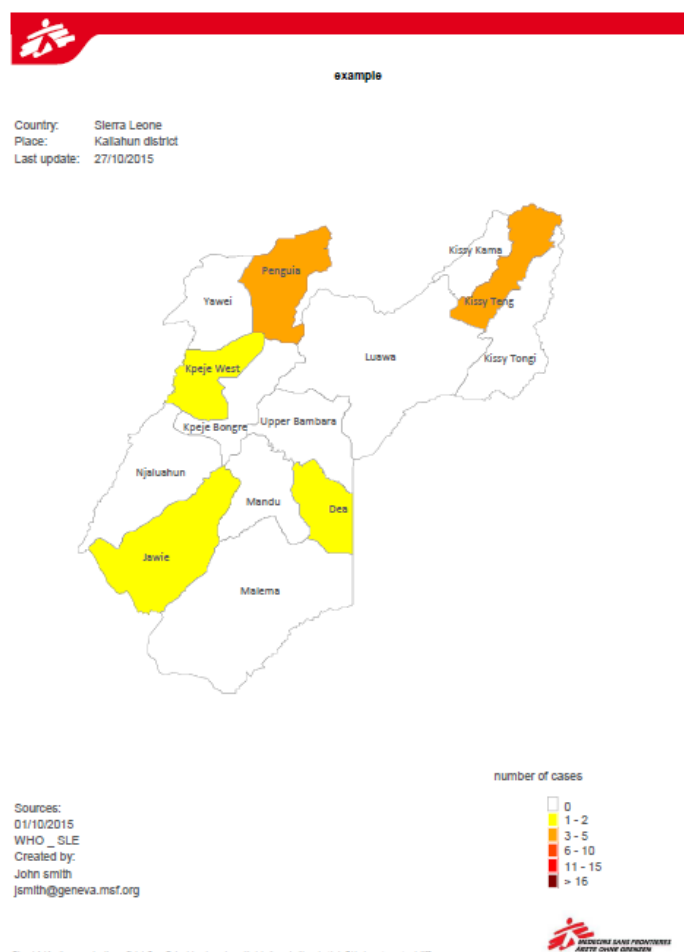
The Excel mapping tools work with Macros. To avoid compatibility issues prefer Microsoft Excel version 2007 or newer.

I. Principle

The principle is simple, we will insert a .emf (enhanced meta file) document in an Excel spreadsheet, separate the image and define a name for each form / label to link information in the Excel worksheet to forms. VBA script present in the template will vary the colors of each shape according to the set values.

II. Set up

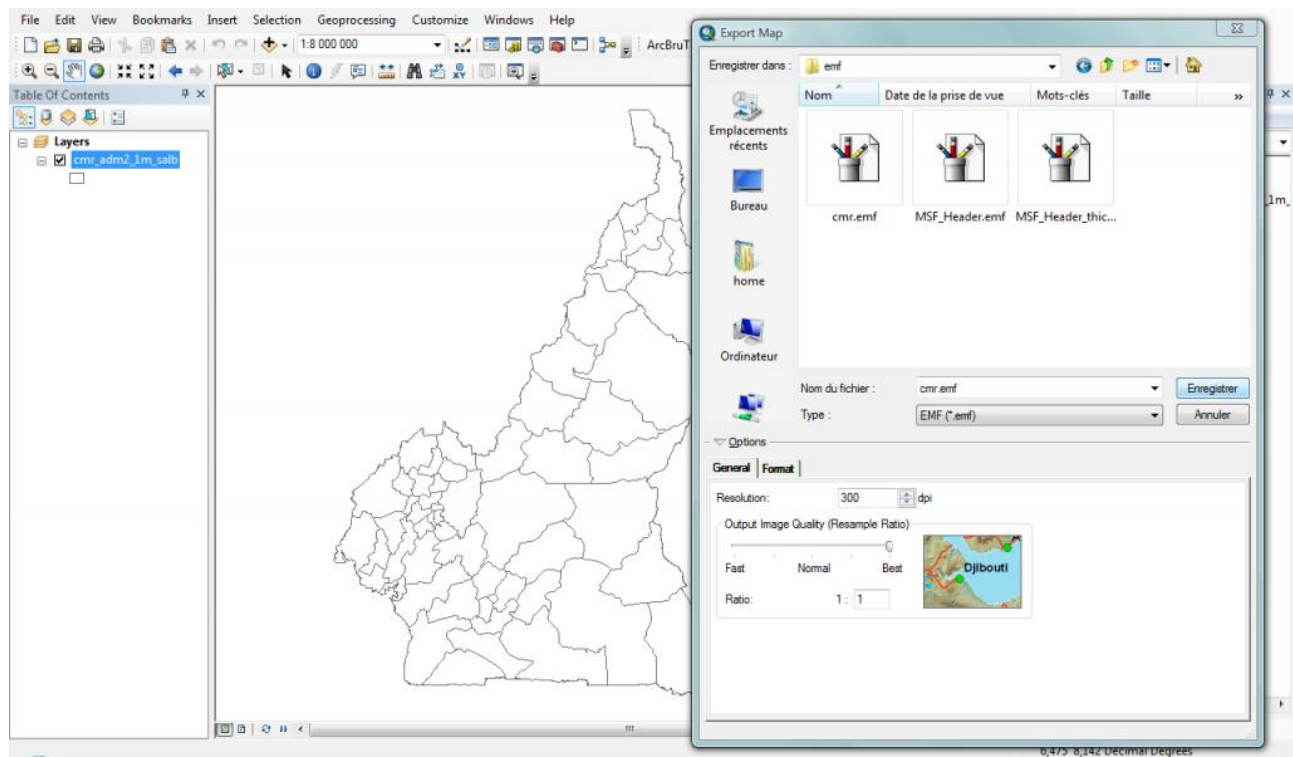
Use the attached xlsmaptools template and make sure to save the original template in the Source folder to retrieve it if necessary. Be careful not to add / remove lines into the document, copy and paste only the values. This template is made with an MSF style. To change the header, go to "page layout" and change the logo accordingly.



III. .emf creation

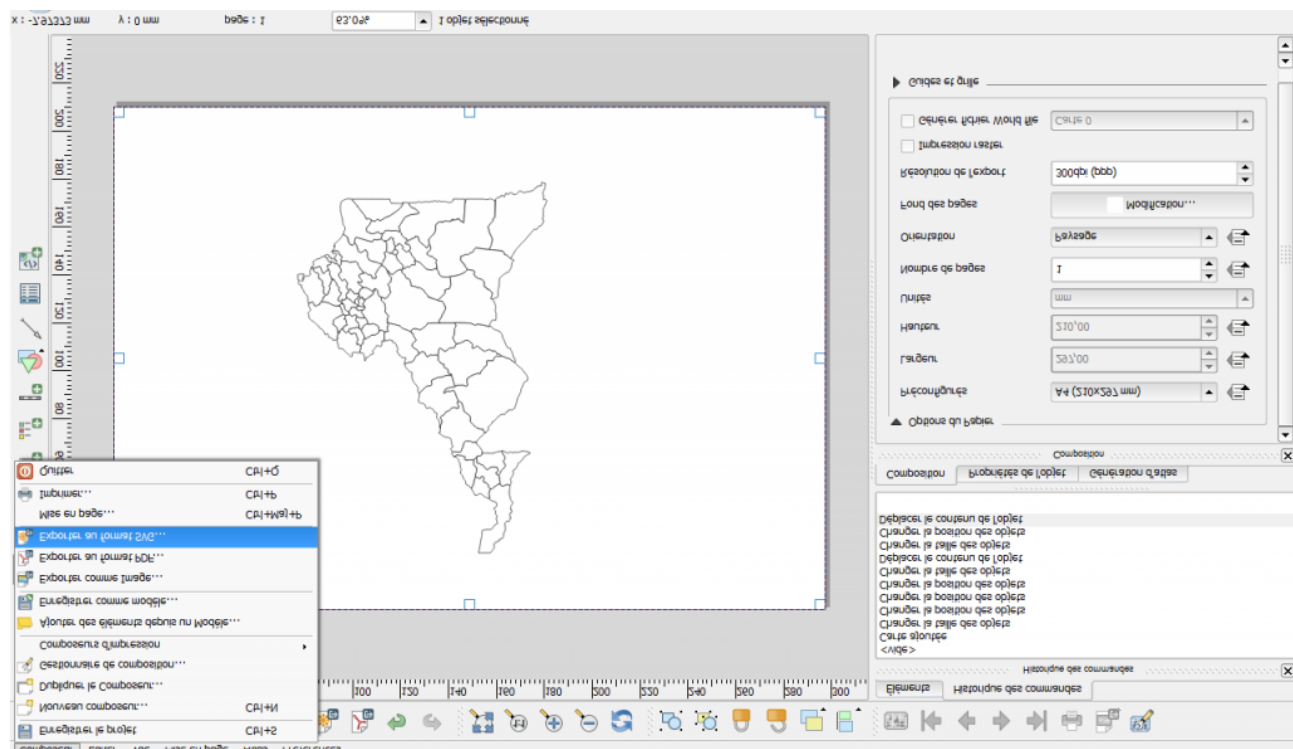
1. With ArcGIS

Make sure your map display doesn't contain any specific symbology (no filling) or any labels, then export your .emf file in your workspace:

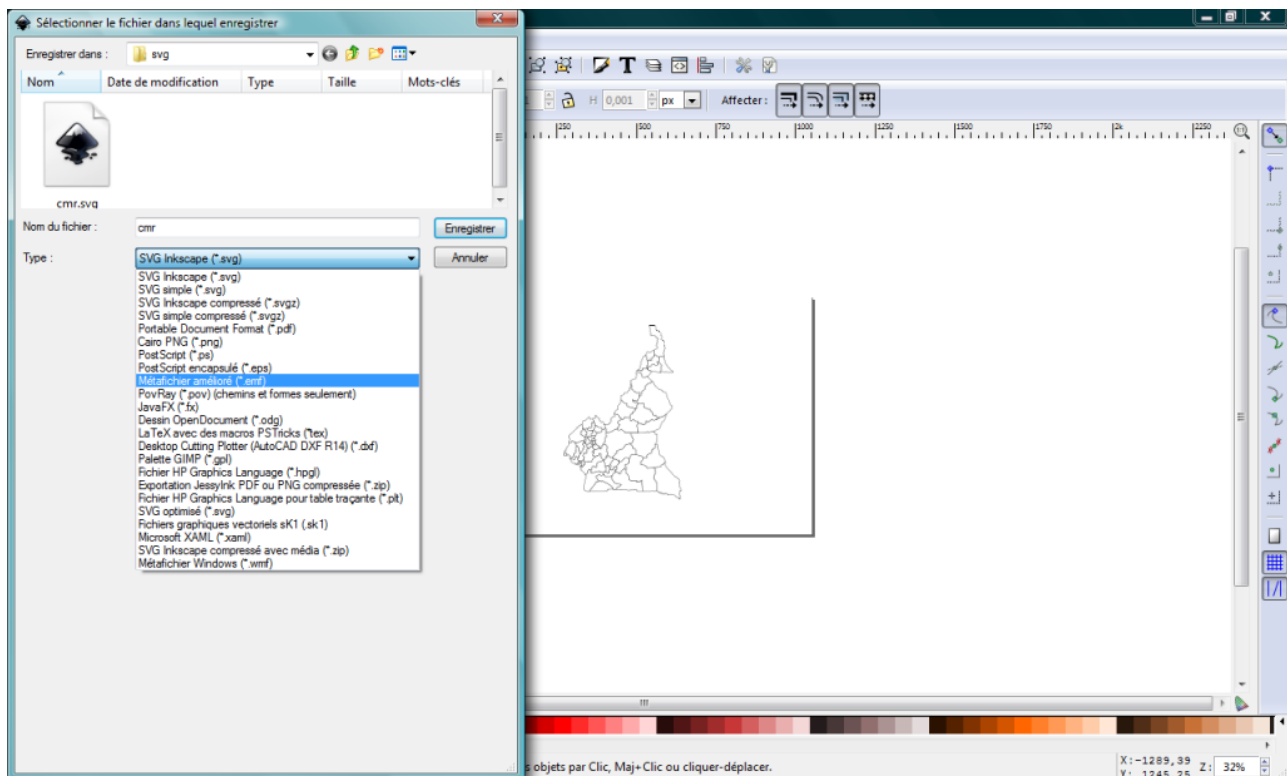


2. With QGIS

Make sure your map display doesn't contain any specific symbology (no filling) or any labels, then export your map as .svg in your workspace:



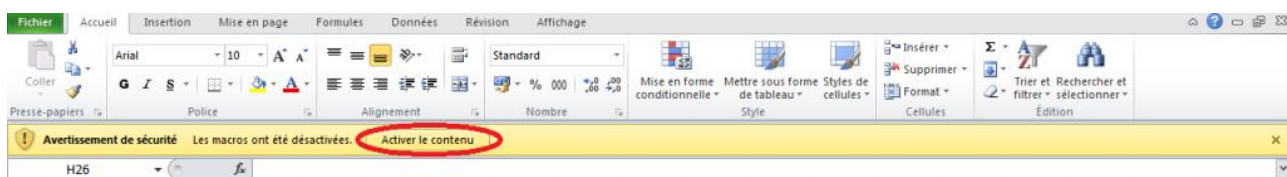
In Inkscape (download link: <https://inkscape.org/>), open the .svg file then save as .emf in your workspace.



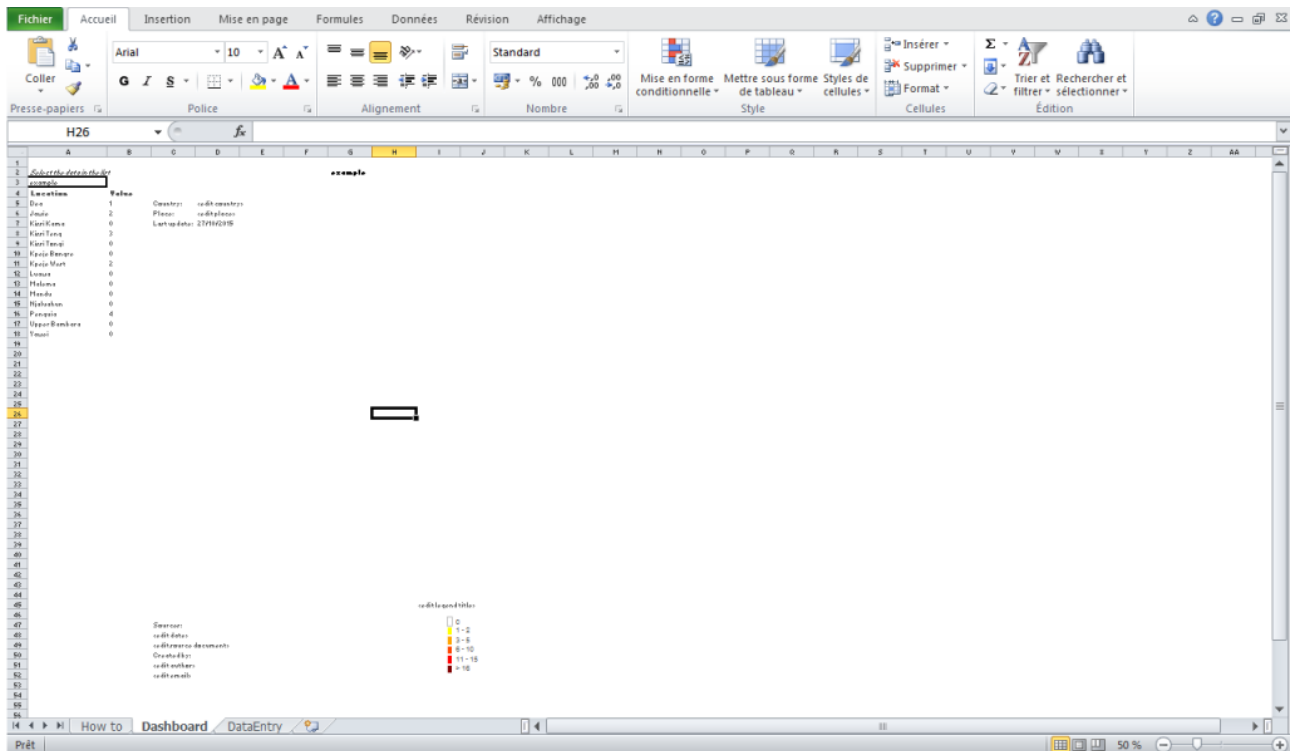
Note: If you only have a picture file (.png , .jpg , .bmp, etc.), online converters are also available to convert pictures into .emf.

IV. Choropleth maps

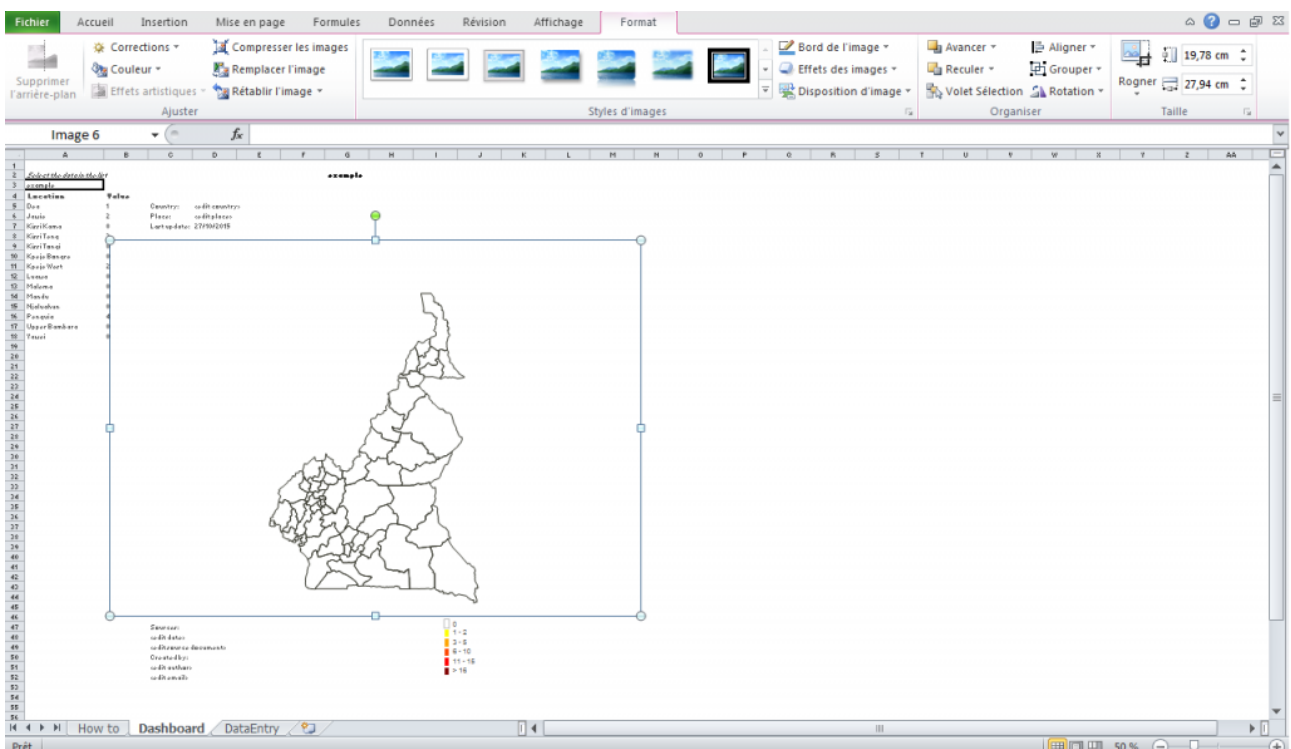
1. Copy the file named xlsmaptools_template.xls
2. Paste it in your workspace.
3. Rename it as the name of your new document.
4. Open your document and **enable the macros**:



5. In *Dashboard* worksheet, delete the map and all the labels. Keep the legend

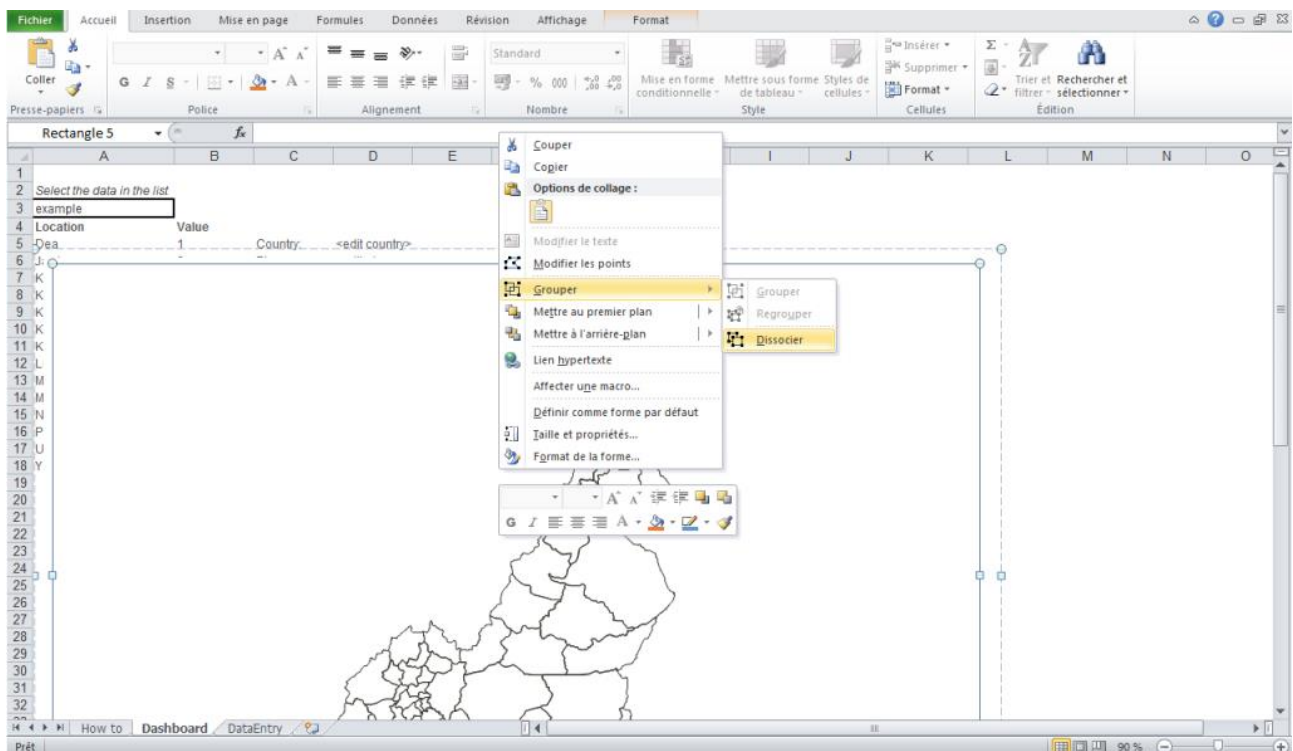


6. Insert your .emf image (Insert/Image/path of the .emf doc) in your Excel doc:



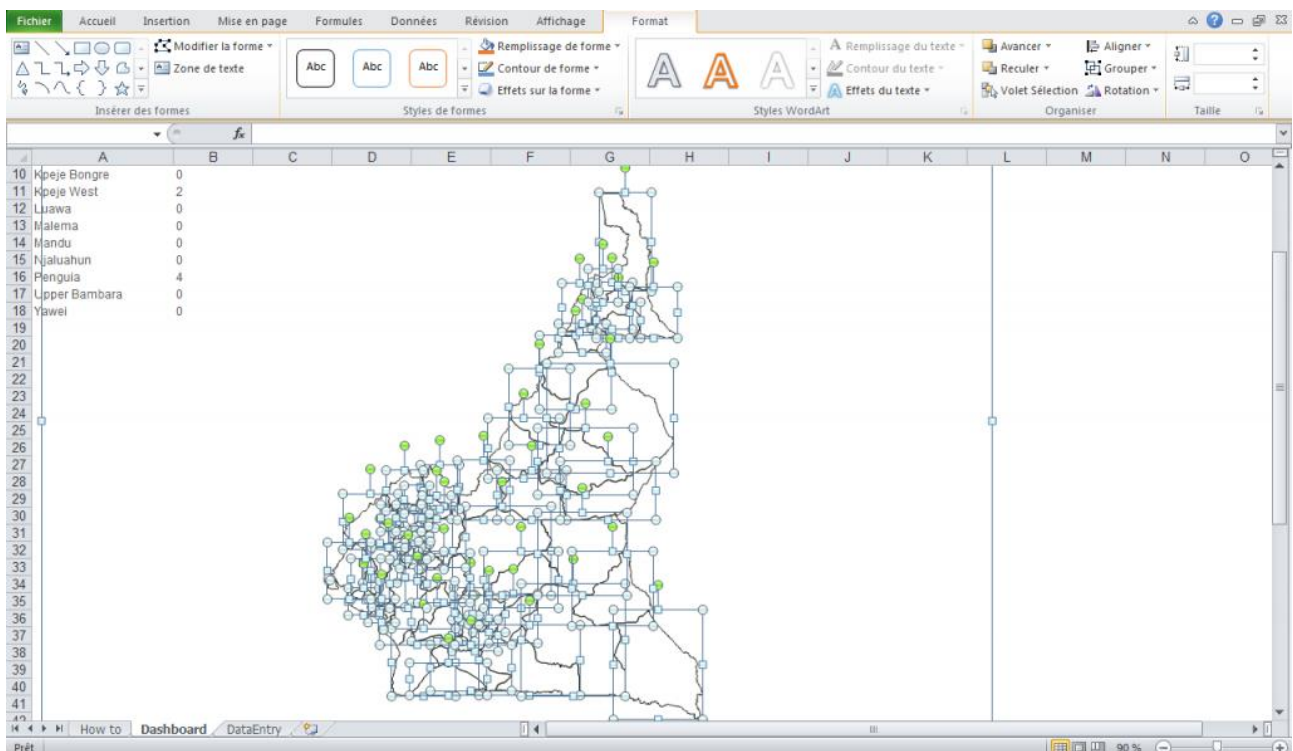
7. Delete the unnecessary Freeforms then adapt your image to the worksheet to obtain a good visual.

8. Ungroup the image. **Right click on the image Group/ungroup:**

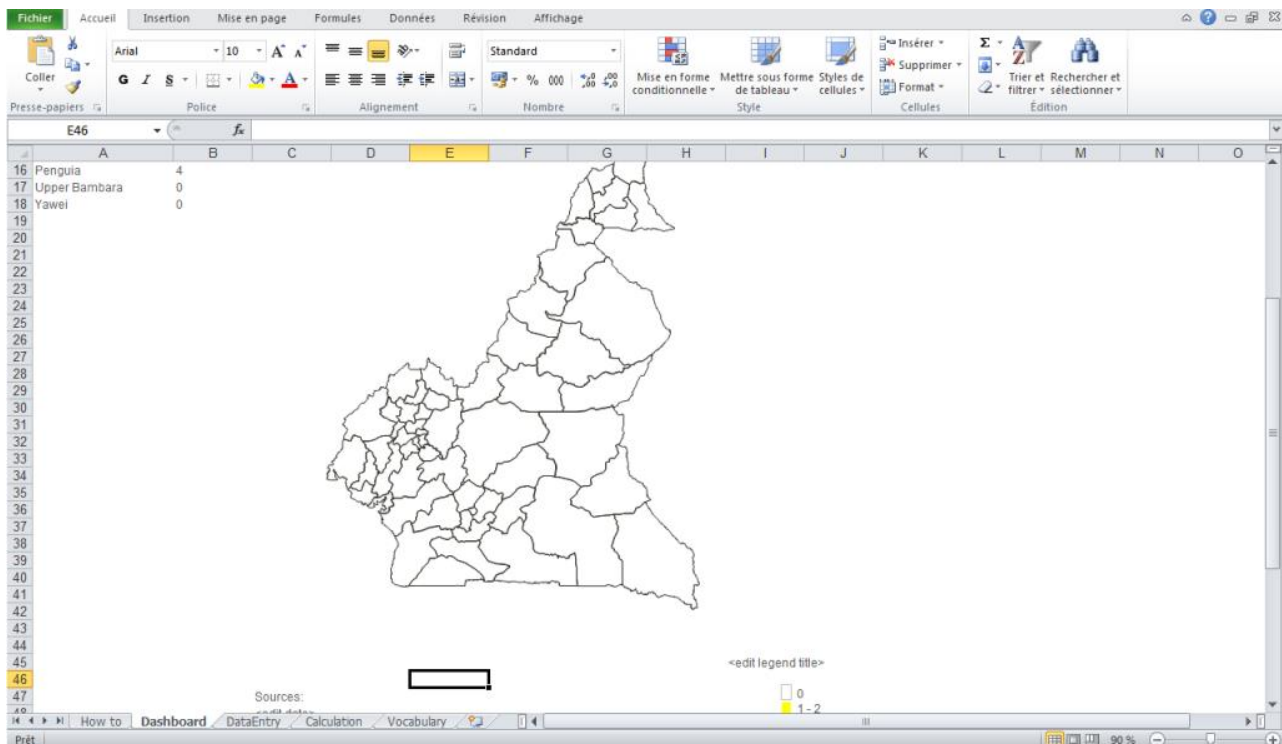
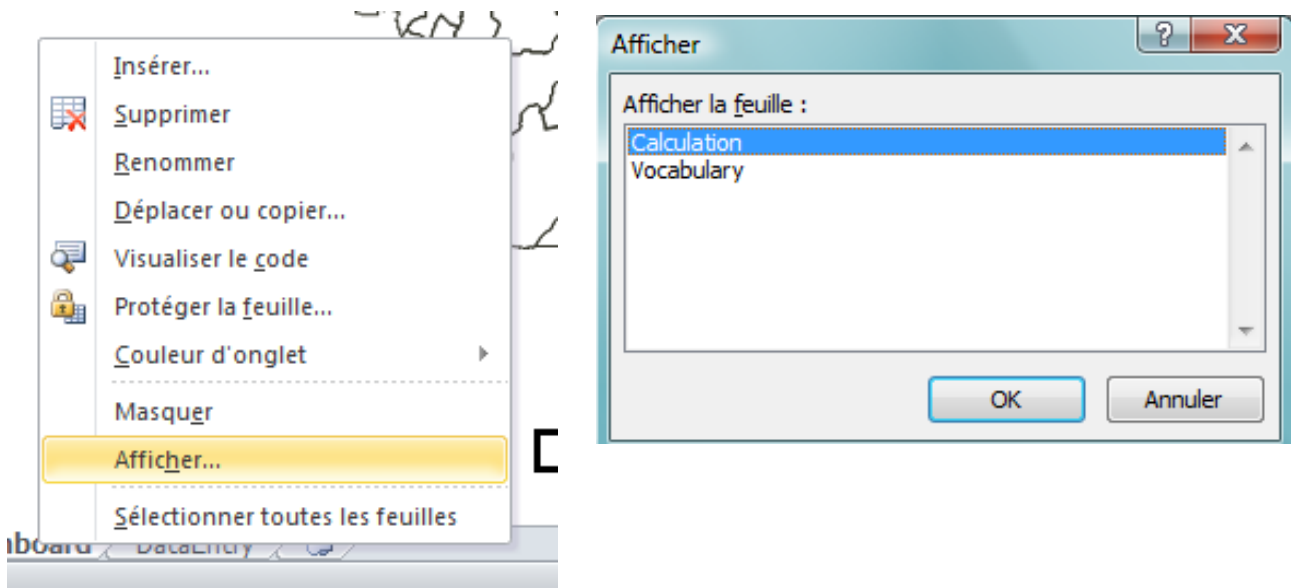


Note: In case of important problems of distortion of your image after ungrouping, insert the image into Microsoft PowerPoint, right click on the image/ Group/Ungroup and select all (Ctrl+A) and copy/paste objects in the Excel worksheet

- Click in one Freeform and select all (Ctrl+A) (Figure 9). In the *Menu toolbar/shape fill* select *no fill*.



- On the Excel file, display worksheets Calculation and Vocabulary (right-click a tab > Un-hide):



- Retrieve field values and IDs in the attribute table of your initial shapefile (.dbf which also opened with Excel):

cmr_adm2_1m_salb.dbf - Microsoft Excel

	E2	fx	Mayo-Louti
1	ADM2_NAME		
2	Mayo-Louti		
3	Benoue		
4	Diamare		
5	Faro		
6	Mayo-Tsanaga		
7	Lekie		
8	Mayo-Kani		
9	Vina		
10	Djerem		
11	Hauts-Plateaux		
12	Nyong-et-Kelle		
13	Nyong-et-Soo		
14	Nyong-et-Mfoumou		
15	Mefou-et-Akono		
16	Mfoundi		

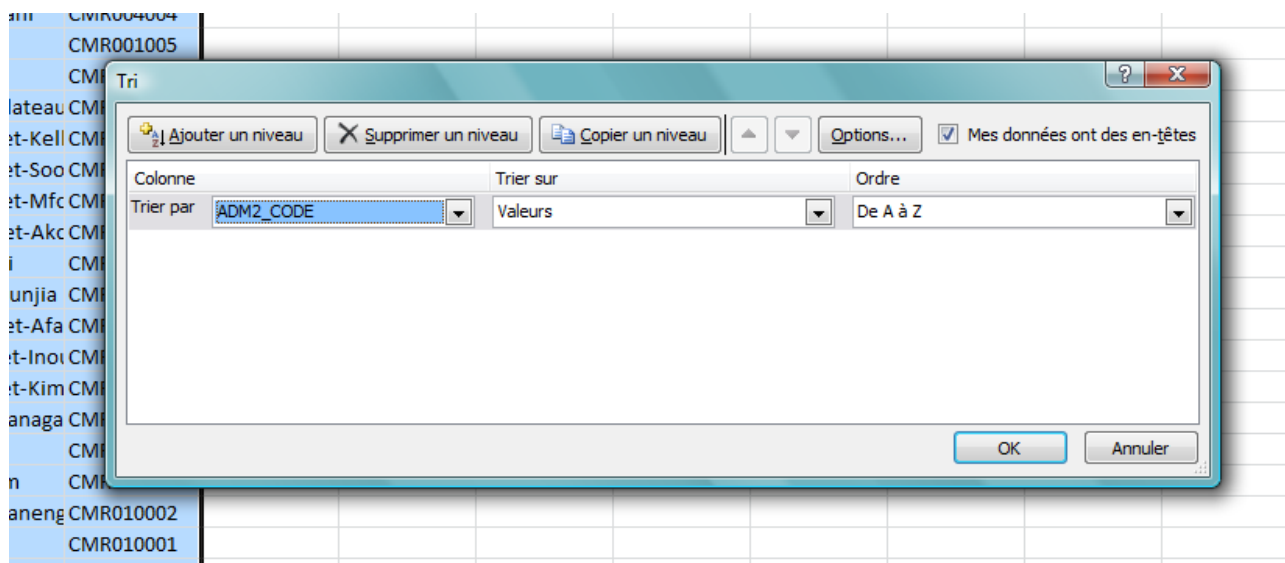
cmr_adm2_1m_salb

cmr_adm2_1m_salb.dbf - Microsoft Excel

	E2	fx	Mayo-Louti
1	ADM2_CODE		
2	CMR006003		
3	CMR006001		
4	CMR004001		
5	CMR006002		
6	CMR004006		
7	CMR002002		
8	CMR004004		
9	CMR001005		
10	CMR001001		
11	CMR008003		
12	CMR002008		
13	CMR002010		
14	CMR002009		
15	CMR002006		
16	CMR002007		

cmr_adm2_1m_salb

Copy/paste in a temporary worksheet then sort them alphabetically or by PCODE:



Don't mix the PCODES by sorting them!

- **Copy/Paste values** for zones and IDs in Location and PCODE rows of Data entry, Calculation and Vocabulary worksheets:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		Data entry			Edit titles, insert data and map information								
2													
3		LOCATION	PCODE	example	cumulative	last 21 days	Alerts						
4		Djerem	CMR001001	1									
5		Faro-et-Deo	CMR001002	2									
6		Mayo-Banyo	CMR001003										
7		Mbere	CMR001004	3									
8		Vina	CMR001005										
9		Haute-Sanaga	CMR002001										
10		Lekie	CMR002002	2									
11		Mbam-et-Inoubou	CMR002003										
12		Mbam-et-Kim	CMR002004										
13		Mefou-et-Afamba	CMR002005										
14		Mefou-et-Akono	CMR002006										
15		Mfoundi	CMR002007	4									
16		Nyong-et-Kelle	CMR002008										
17		Nyong-et-Mfoumou	CMR002009										
18		Nyong-et-Soo	CMR002010										
19		Boumba-Et-Ngoko	CMR003001										
20		Haut-Nyong	CMR003002										
21		Kadel	CMR003003										
22		Lom-Et-Djerem	CMR003004										
23		Diamare	CMR004001										
24		Logone-Et-Chari	CMR004002										
25		Mayo-Danay	CMR004003										
26		Mayo-Kani	CMR004004										
27		Mayo-Sava	CMR004005										

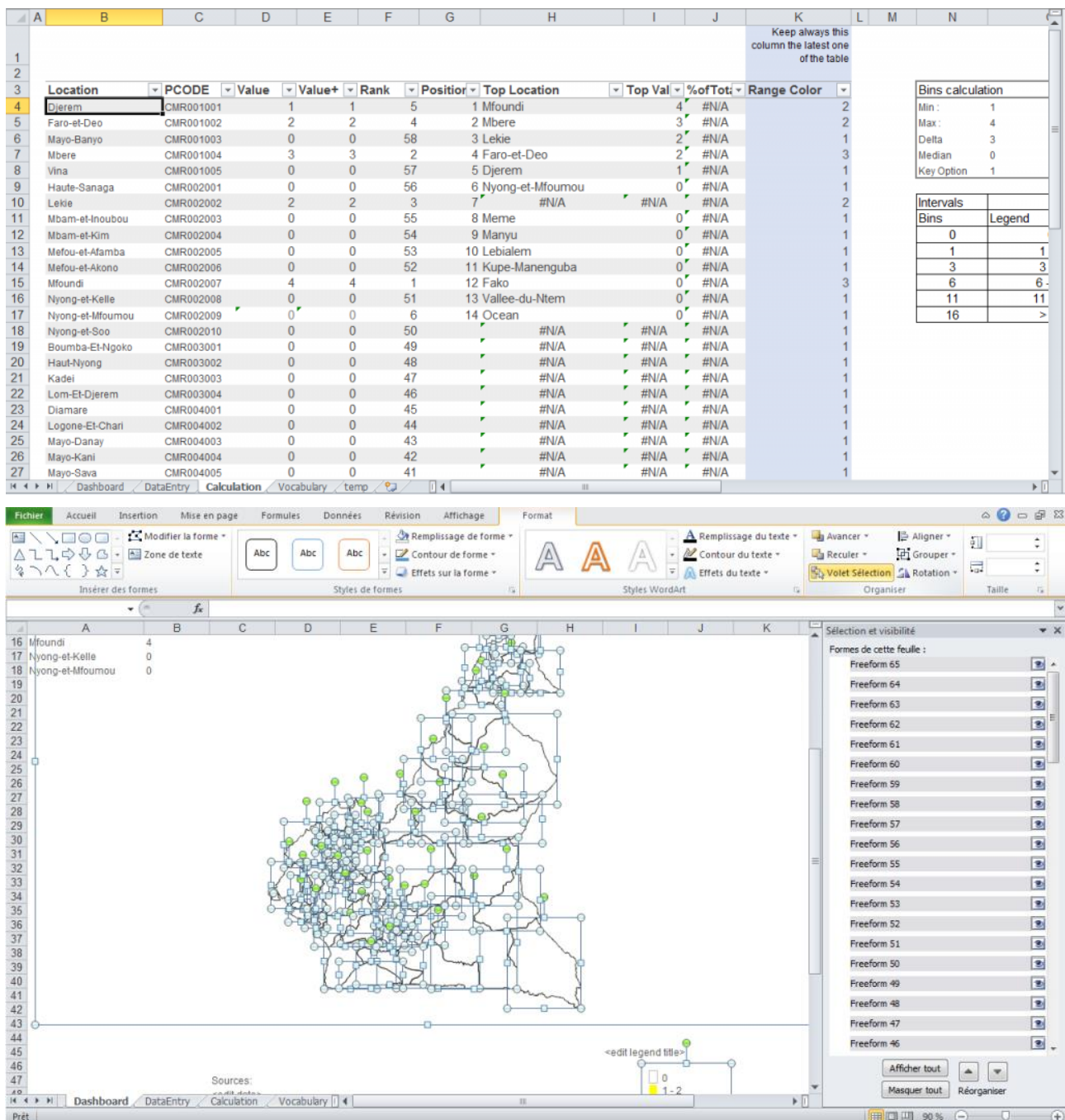
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
R	G	B	Color	LOCATION	PCODE									
255	255	255	sample color	Djerem	CMR001001									
255	255	0	sample color	Faro-et-Deo	CMR001002									
255	165	0	sample color	Mayo-Banyo	CMR001003									
255	69	0	sample color	Mbere	CMR001004									
255	0	0	sample color	Vina	CMR001005									
128	0	0	sample color	Haute-Sanaga	CMR002001									
DO NOT ADD MORE ROWS TO THIS TABLE				Lekie	CMR002002									
				Mbam-et-Inoubou	CMR002003									
				Mbam-et-Kim	CMR002004									
				Mefou-et-Afamba	CMR002005									
				Mefou-et-Akono	CMR002006									
				Mfoundi	CMR002007									
				Nyong-et-Kelle	CMR002008									
				Nyong-et-Mfoumou	CMR002009									
				Nyong-et-Soo	CMR002010									
				Boumba-Et-Ngoko	CMR003001									
				Haut-Nyong	CMR003002									
				Kadei	CMR003003									
				Lom-Et-Djerem	CMR003004									
				Diamare	CMR004001									
				Logone-Et-Chari	CMR004002									
				Mayo-Danay	CMR004003									
				Mayo-Kani	CMR004004									
				Mayo-Sava	CMR004005									
				Mayo-Tsanaga	CMR004006									
				Moungo	CMR005001									
				Nkam	CMR005002									
				Sanaga-Maritime	CMR005003									

A	B	C	D	E	F	G	H	I	J	K	L	M	N
										Keep always this column the latest one of the table			
	Location	PCODE	Value	Value+	Rank	Position	Top Location	Top Val	%ofToti	Range Color			
4	Djerem	CMR001001	1	1	5	1 Mfoundi	4	#N/A	2				
5	Faro-et-Deo	CMR001002	2	2	4	2 Mbere	3	#N/A	2				
6	Mayo-Banyo	CMR001003	0	0	58	3 Lekie	2	#N/A	1				
7	Mbere	CMR001004	3	3	2	4 Faro-et-Deo	2	#N/A	3				
8	Vina	CMR001005	0	0	57	5 Djerem	1	#N/A	1				
9	Haute-Sanaga	CMR002001	0	0	56	6 Nyong-et-Mfoumou	0	#N/A	1				
10	Lekie	CMR002002	2	2	3	7	#N/A	#N/A	2				
11	Mbam-et-Inoubou	CMR002003	0	0	55	8 Meme	0	#N/A	1				
12	Mbam-et-Kim	CMR002004	0	0	54	9 Manyu	0	#N/A	1				
13	Mefou-et-Afamba	CMR002005	0	0	53	10 Lebialem	0	#N/A	1				
14	Mefou-et-Akono	CMR002006	0	0	52	11 Kupe-Manenguba	0	#N/A	1				
15	Mfoundi	CMR002007	4	4	1	12 Fako	0	#N/A	3				
16	Nyong-et-Kelle	CMR002008	0	0	51	13 Vallee-du-Ntem	0	#N/A	1				
17	Nyong-et-Mfoumou	CMR002009	0	0	6	14 Ocean	0	#N/A	1				
18	Nyong-et-Soo	CMR002010	0	0	50	#N/A	#N/A	#N/A	1				
19	Boumba-Et-Ngoko	CMR003001	0	0	49	#N/A	#N/A	#N/A	1				
20	Haut-Nyong	CMR003002	0	0	48	#N/A	#N/A	#N/A	1				
21	Kadei	CMR003003	0	0	47	#N/A	#N/A	#N/A	1				
22	Lom-Et-Djerem	CMR003004	0	0	46	#N/A	#N/A	#N/A	1				
23	Diamare	CMR004001	0	0	45	#N/A	#N/A	#N/A	1				
24	Logone-Et-Chari	CMR004002	0	0	44	#N/A	#N/A	#N/A	1				
25	Mayo-Danay	CMR004003	0	0	43	#N/A	#N/A	#N/A	1				
26	Mayo-Kani	CMR004004	0	0	42	#N/A	#N/A	#N/A	1				
27	Mayo-Sava	CMR004005	0	0	41	#N/A	#N/A	#N/A	1				

Bins calculation	
Min :	1
Max :	4
Delta :	3
Median :	0
Key Option :	1

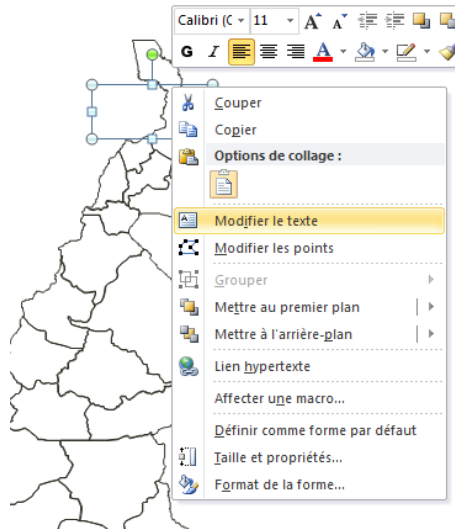
Intervals	
Bins	Legend
0	
1	1
3	3
6	6
11	11
16	>

- If the number of rows of your new *Location* array exceeds the total number of rows of existing array, copy/paste the formula of previous lines on the *Dashboard* worksheet (Link to *Location* array in *Calculation* worksheet). Do the same on the *Value* column.
- If the number of lines of your new *Location* array is less than the total number of rows of existing array, clear the excess cells on the *Dashboard* worksheet (Link to *Location* array in *Calculation* worksheet)). Do the same on the *Value* column.
- Record the PCODES for each Freeform. Define a name for each Freeform (use your initial attribute table) using the following format: PCODE_1. In this example, CMR004002_1 for Logone et Chari. To determine the name of each Freeform, select a shape, go to Format/Selection pane. In the opened window, double click on the name of the Freeform, then rename it and press Enter. Use the **hide/Unhide** symbol to check then do the same for the next one.

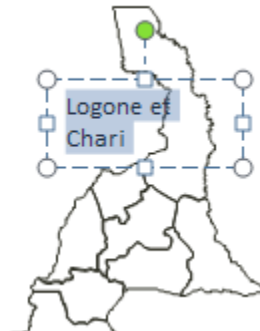


Note: If you forget to press Enter, your new name will not be recorded!

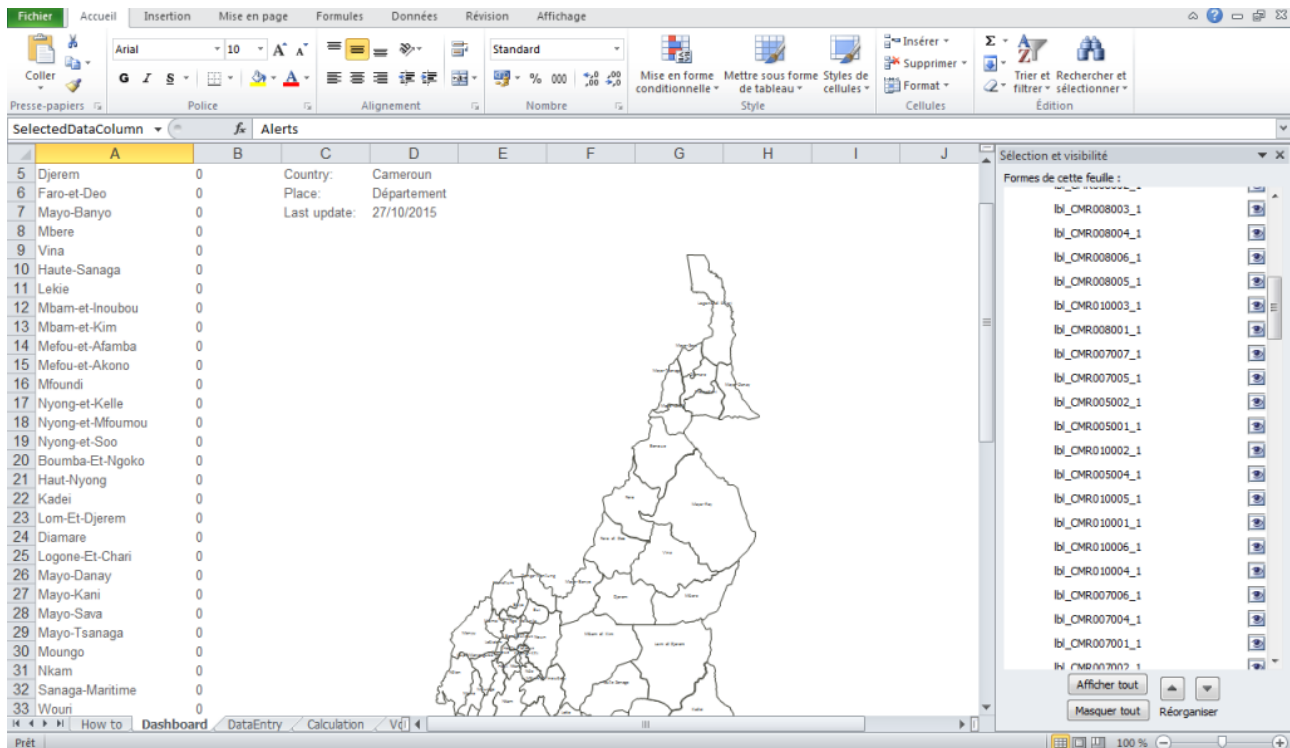
- Create a label for each Freeform. **Insert/Shape**, select a rectangle then in the drawing tools (click on the shape) Format/shape fill/no fill; Shape Outline/No Outline. **Right click on the shape** then **Modify text** to rename your text:



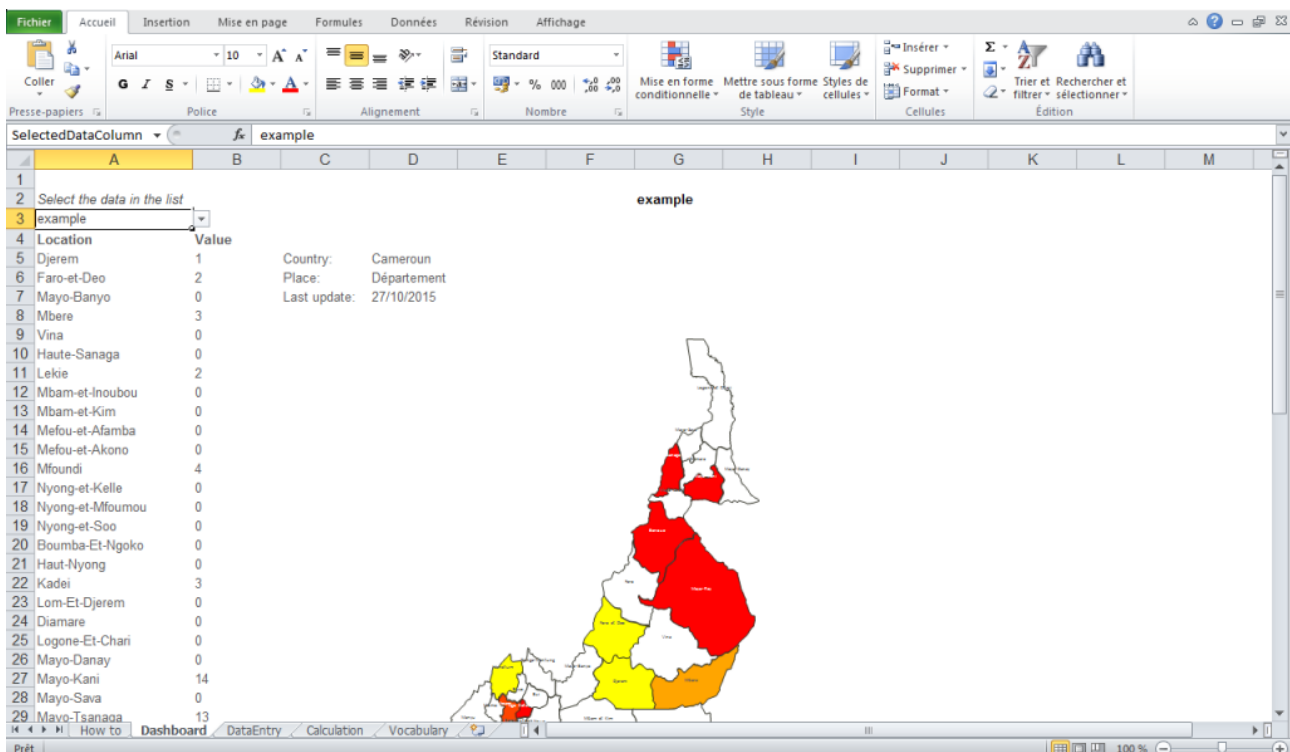
- Define a name for each label using the following format: lbl_PCODE_1 (using one ID for each Freeform).
- To determine the name of each label, select a label (or a shape) , go to Format / Selection pane. In the opened window, click the label name, rename it and press Enter:



Use the same way to rename all the shapes:



- Fill your map information in Data entry worksheet.
- Hide *Calculation* and *Vocabulary* worksheets.
- Save the document.
- The VBA script, present in the template will assign the color which corresponds to the defined values:



Your choropleth map is now ready! MSF Headers and logos are saved in the Excel workbook, you just need to print your map.

V. If you need to change the values intervals

1. **Display** the Calculation work sheet.
2. **Modify** the values in *Bin* column of the *intervals* array and modify the Legend from Legend column.
3. **Hide** *Calculation* worksheet.
4. **Save** the document.

Be sure that the Values Inputs in the legend match with the desired values!

VI. To go forward...

This method can be binding on a map with a large number of entities due to manual recording shapes and labels. However, you can visit the following links for more information:

<http://www.hypergeo.eu/spip.php?article274>

<http://robbiecwilson.hubpages.com/hub/How-to-create-a-thematic-or-Choropleth-map-in-Excel-2007-and-Excel-2010>

http://www.clearlyandsimply.com/clearly_and_simply/2009/08/build-your-own-choropleth-maps-with-excel.html

http://www.tushar-mehta.com/publish_train/xl_vba_cases/0301-dashboard-conditional_shape_colors.htm