Towards a Random-Representative Sampling Scheme

Files to use in QGIS:

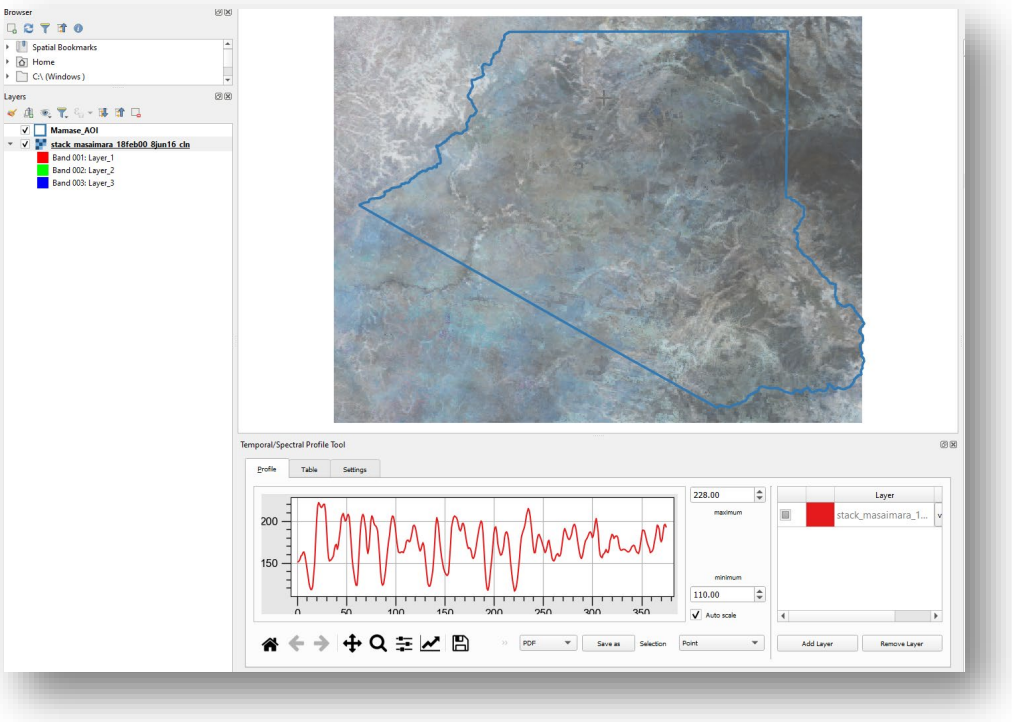
- **stack_masaimara_18feb00_8jun16_cln.img**
  a spatial-temporal stack of 375 cleaned MODIS-Terra NDVI-images. Each NDVI-image is rescaled to the 0-255 DN-value range. Each image represents the Maximum Value Composite of daily imagery across a 16-day period. There are 23 images each year. Cleaning is carried out through the TimeSat upper-envelop filter. source: MOD13Q1 v5 see: https://lpdaac.usgs.gov/products/mod13q1v006/
- **Mamase_AOI.shp**
  A polygon that defines the study-area for (benchmark-) mapping the grazing lands of the Masai Mara.

Rescale MODIS NDVI-data

MODIS NDVI data (MOD13Q1), are coded from -3,000 to 10,000. To recale them to 0-255 DN-Values, and considerably reduce file sizes, consider the following:

Linear Interpolation: Y=a+bX		
Source	Target	Label
-3000	0	missing value
-2000	0	low of range
10000	255	high of range
2000	85	value where veg starts
0	42.5	
b	212.5	
a	42.5	

Formula: **DN** = Integer of (0.02125 * **NDVI** + 42.5 + 0.5)

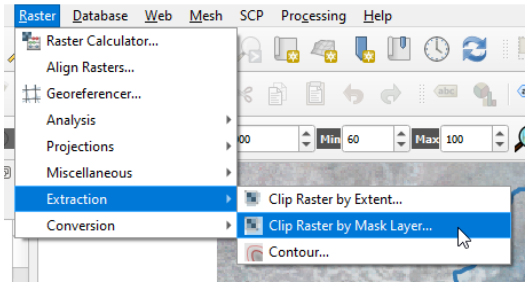


Explore the Stack

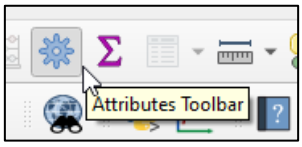
- Install the plugin: “Temporal/Spectral Profile Tool”
- Select the raster file
- Select the  option (the plugin), and select any raster-cell to see its temporal NDVI-profile

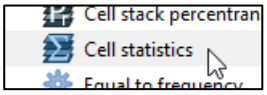
Mask the raster through the AOI polygon

- Select the IMG and SHP
- Save the result as: **Stack_Mamase_AOI.TIF**



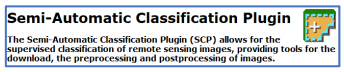
Calculate the SD and Median Images

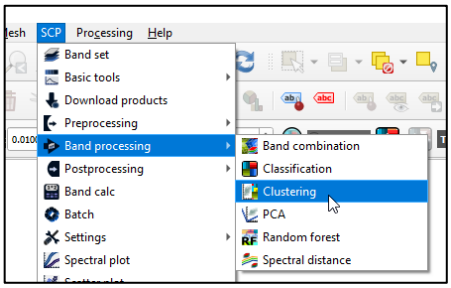
- Select: 

- Select: 

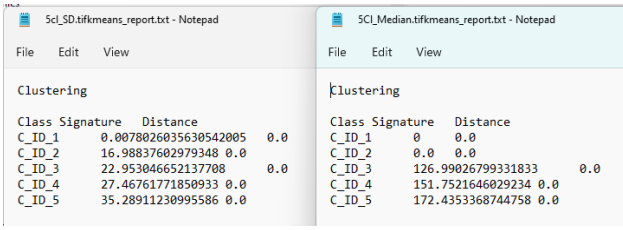
- Then: Select as input layer the AOI-stack,
  Select either Standard Deviation or Median
  Specify output files [*NOTE: it seems this routine is providing incorrect outputs*]
- NOTE: Under directory **/ORIG/** I have provided correct output files: **stack_masaimara_Median.img** and **stack_masaimara_SD.img,** and two masked files **Median_AOI.TIF** and **SD_AOI.TIF**.
  You are advised to use this very set of TIFs.

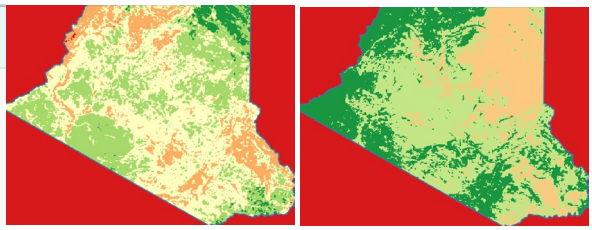
K-Means unsupervised classification

- Install the plugin: 

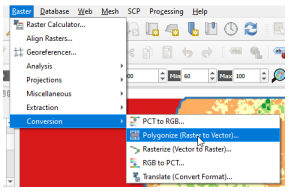
  Refer for info to: https://www.youtube.com/watch?v=tRDk0tAkQ94
- And select: 

- Then first select a single “Band set”, and then use from “Band processing” the K-Means clustering method, to create a 5 (or more) clusters TIF. Select to use “0” as no-data.
  Also save the resulting signatures to a file. Various iterations will follow. Repeat this for both files (SD and Median). I got using the above, the following clusters.

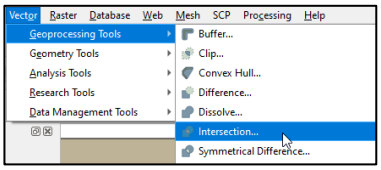


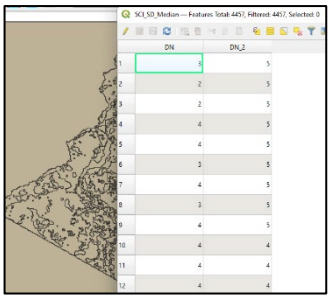


Convert these 2 TIFs to SHPs

- Use “Polygonize” for each of the 2 TIFs and save as SHPs: 

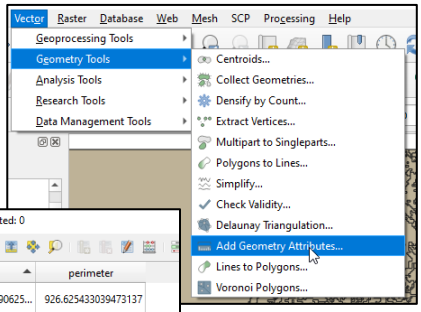
- Use the “Intersection” option to combine both SHP-files into one SHP-file (and check the Attribute Table): [*make sure it is a “**S**ingle-**P**art” SHP-file*]

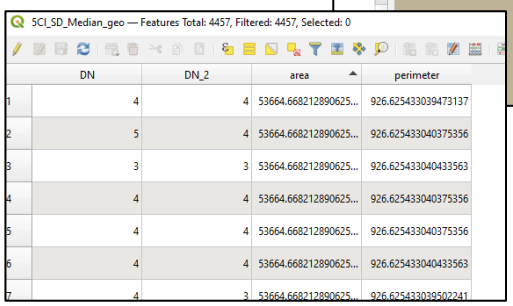




Add the required Geometry info the SHP-file

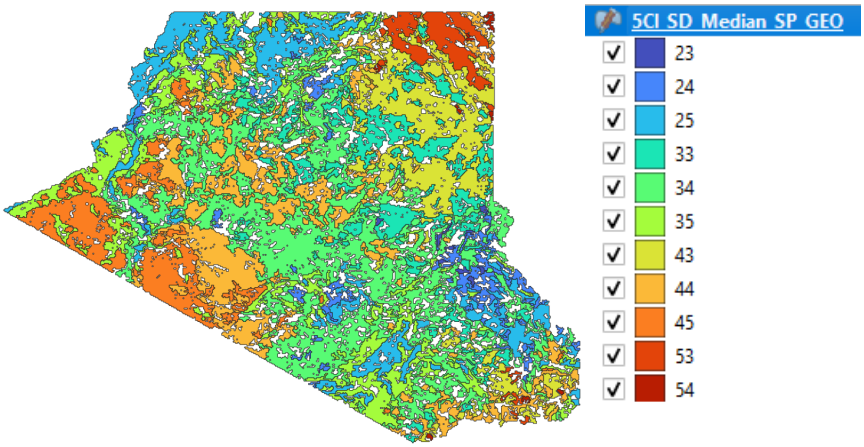
- Add the polygon areas to each polygon through:
- And save the results in a new SHP file.





Select the larger Polygons

- Open the "Attribute Table" of the file with the GeoMetry, and select all polygons that are smaller than 1,000,000 m^2 (100 ha or about 16 pixels). Also remove the background along the AOI [put "Edit" on to delete polygons]. I am now left with 599 polygons.
- Create in the Table a new field and put there the result of: { 10*DN + DN_2 }.
- Create a nice coloured legend using that new field.
- I now got:



Next steps to do / Considerations / Discussion

- Add a road/paths layer and clip the above to about 1km distance to roads: these are the accessible areas to survey (unless you have an off-road permit from the park-management).
- Divide your available time by 11 (11 unique SD-Median combinations to sample equally!
- Sample each SD-Median combination multiple times either randomly within given polygons or representative after observing the contents of a polygon. The latter option is important when you have little time and must collect proper representative (observer defined!!) samples.
- Keep track that each combination is sampled and that you do cover the full range of variability.

Underlying assumption: The long-term SD and Median values of NDVI readings capture the actual variability in range-types (cover-types) in the study-area. Note: many of the above classes are NOT grasslands; thus classification must be more specific (it is now too generalized).

Our experience: YES that is correct at macro level, BUT locally (micro-level) terrain also creates lots of variability in range-types. Thus: combine the above with a Relative DEM (of 30m resolution). See the PPT.