Methods: Calculating Past Harvest Area in Each Year in Each Fire

Step 1: Obtain the CanLaDs data for past disturbance (type) (from here: <https://open.canada.ca/data/en/dataset/add1346b-f632-4eb9-a83d-a662b38655ad/resource/978c00bb-6b8f-41f0-9d02-7e92f75d43b0>) and extract only harvest. Then vectorize so that we have a shapefile of harvested area.

How I did this:

Cut the raster: First I cut the raster from CanLaDs to the BC shapefile that I got from Natural Earth Data (<https://www.naturalearthdata.com/downloads/50m-cultural-vectors/>). This is just to make the data more manageable. I then clipped it to the shapefiles for the selected fires (sent to me by Doriana). This was a bit more complicated because I had to flatten (remove the elevation component) the fire perimeters, which is why the code to clip the data is more complicated.

Extract harvest & vectorize: I then selected all pixels that had a value of 2 (harvest) and converted it to vector data using code from here: <https://gis.stackexchange.com/questions/187877/how-to-polygonize-raster-to-shapely-polygons>, using the rasterio package: <https://rasterio.readthedocs.io/en/latest/>. I then converted this vectorized data to a Geopandas dataframe and then dissolved the vectorized pixels so that we got continuous shapefiles (a multipolygon) that we could calculate area harvested in each year. I then created a geojson file containing the data and saved it to the Google drive. \*

\* There was a problem because the raster data was created using a projection that is not recognized by the Geopandas package. So, the resulting data did not have a projection associated with it (which could result in errors when clipping). I resolved this by downloading the geojson file and importing it to QGIS. I then used the Assign Projection tool to assign the correct projection to it EPSG:42309 / NAD 83 / LCC Canada AVHRR-2 and then the Reproject Layer tool to project it to WGS1984. I then re-uploaded the file to the Google Drive for use in the next steps in data preparation.

Step 2: Getting year harvested inside fire and calculating the area.

How I did this:

1. Clip the CanLabs latest year of disturbance raster to the fires. (QGIS)
2. Run the raster pixels to polygons tool to create a new layer. (QGIS)
3. For each year disturbed in the new vector file, (a) dissolve the layer, (b) simplify the geometry if needed (if it is too large, it is difficult to work with and sometimes does not generate properly), (c) output this new file as a geojson file. (Python) Convert geojson to shp file. (QGIS)
4. Use the geopandas spatial join tool to perform a left join with the specification that to be joined the two layers (BC fires from step 1 and each vector file from step 4) must intersect. If geometry not simplified in step 4, the convex hull of individual components (generated using geopandas .explode() ) of the affected areas is used for the intersection. If using explode, geometries need to be dissolved by FIRE\_ID before outputting to new file. (Python)
5. For each selected fire, reproject to an equal area projection and calculate area harvested in each year by clipping the file by the area harvested AND the year of interest shapefiles and then using the .area tool from Geopandas (<https://geopandas.org/en/stable/docs/reference/api/geopandas.GeoSeries.area.html>). (Python) Download and convert to shp. (QGIS)