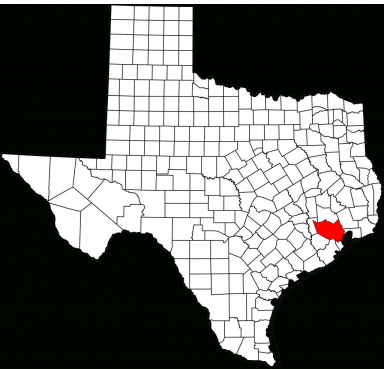
Topic: A GIS-based Visualization of Pollution and Community Park Land Suitability Analysis in Harris County, Texas

Final Project Presentation

GEOG 392/676: GIS PROGRAMMING



Team Lead: Joe Johnson

TEXAS A&M UNIVERSITY

Team Members

Sr. No	Member Name	Email ID	Student Role
1	Joe Johnson	joejohnson2905@tamu.edu	Graduate
2	Robert Arends	rugbug@tamu.edu	Undergraduate
3	Humza Ahmed	humza.ahmed25@tamu.edu	Undergraduate
4	Zachary Roberts	zacharyjroberts24@tamu.edu	Undergraduate
5	Ian McDowell	ianmcd22@tamu.edu	Undergraduate

Team Member Responsibilities

Task split-up:

Task	Data Collection	GIS Analysis	Final Report	Poster	Git Upload	Demo Video
Joe Johnson	X	X	X		X	X
Robert Arends	X		X	X		X
Humza Ahmed		X	X	X		X
Zachary Roberts	X		X	X		X
Ian McDowell	X		X	X		X

Deliverables/Objective

- The goal of this project is to **evaluate available undeveloped land for proposing a community park** based on **pollution level parameters** that are deemed suitable for the park and the Harris County community.

- This helps to **alleviate** the issue of health hazard due to pollution for outdoor activities in the future.

- To benefit more residents, the new community park should be in the neighborhood with population of **atleast ten thousand residents**.

Deliverables/Objective

- The new park is for the recreational use, the location of the park should be **atleast 2 miles away** from all **toxic chemical facilities** (Industrial park, oil refineries, and fracking wells).

- The proposed park should not be close to **existing parks** and maintain **atleast half miles** distance from the existing park.

- The community park should be situated in **low-risk air-pollution areas** with size between **30 to 100 acres**.

Data Description

- Harris_County_Boundary:
  - Source: Harris County Apprisal District
  - Data Type: Shapefile Feature Class
  - Geometry Type: **Polygon**
  - Geographic Coordinate System (GCS): NAD 1983
  - Projected Coordinate System (PCS): NAD 1983 StatePlane Texas S Central FIPS 4204 (US Feet)
- Undeveloped_Land_Harris:
  - Source: Harris County Apprisal District
  - Data Type: Shapefile Feature Class
  - Geometry Type: **Polygon**
  - GCS: NAD 1983
  - PCS: NAD 1983 StatePlane Texas S Central FIPS 4204 (US Feet)
- Existing_Parks_Harris:
  - Source: Houston-Galveston Area Council
  - Data Type: Shapefile Feature Class
  - Geometry Type: **Point**
  - GCS: NAD 1983
  - PCS: NAD 1983 StatePlane Texas S Central FIPS 4204 (US Feet)
- Superfund_npl_Harris (Toxic facilities):
  - Source: Not Available
  - Data Type: Shapefile Feature Class
  - Geometry Type: **Point**
  - GCS: NAD 1983
  - PCS: Not Defined

Data Description (Continued)

- Population_layer_Harris:
  - Source: Not Available
  - Data Type: Shapefile Feature Class
  - Geometry Type: **Polygon**

- Oil_Refineries_Harris:
  - Source: Homeland Infrastructure Foundation-Level (HIFLD) Database
  - Data Type: Shapefile Feature Class
  - Geometry Type: **Point**
  - GCS: WGS 1984
  - PCS: Not Defined

- Fracking_wells_Harris
  - Source: Texas Railroad Commission
  - Data Type: Shapefile Feature Class
  - Geometry Type: **Point**
  - GCS: WGS 1984
  - PCS: WGS 1984 Web Mercator

- Facilities_all_Harris
  - Source: https://hub.arcgis.com/
  - Data Type: Feature Service Feature Class
  - Geometry Type: **Point**
  - GCS: WGS 1984
  - PCS: WGS 1984 Web Mercator

Raster Data Description (Continued)

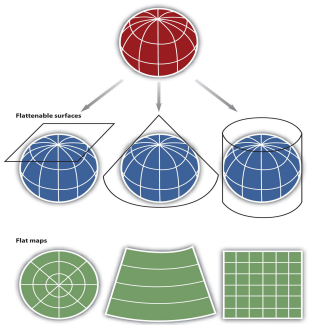
- PM2_5_Avg_2016_Harris:
  - Source: https://hub.arcgis.com/
  - Data Type: **Raster** Feature Class
  - GCS: WGS 1984
  - PCS: NA
  - Average PM2.5 for the year 2016

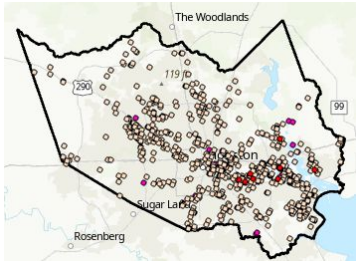
- EPA_Air_Toxicity_Cancer_Harris
  - Source: Harris County Apprisal District
  - Data Type: **Raster** Feature Class
  - GCS: WGS 1984
  - PCS: NA

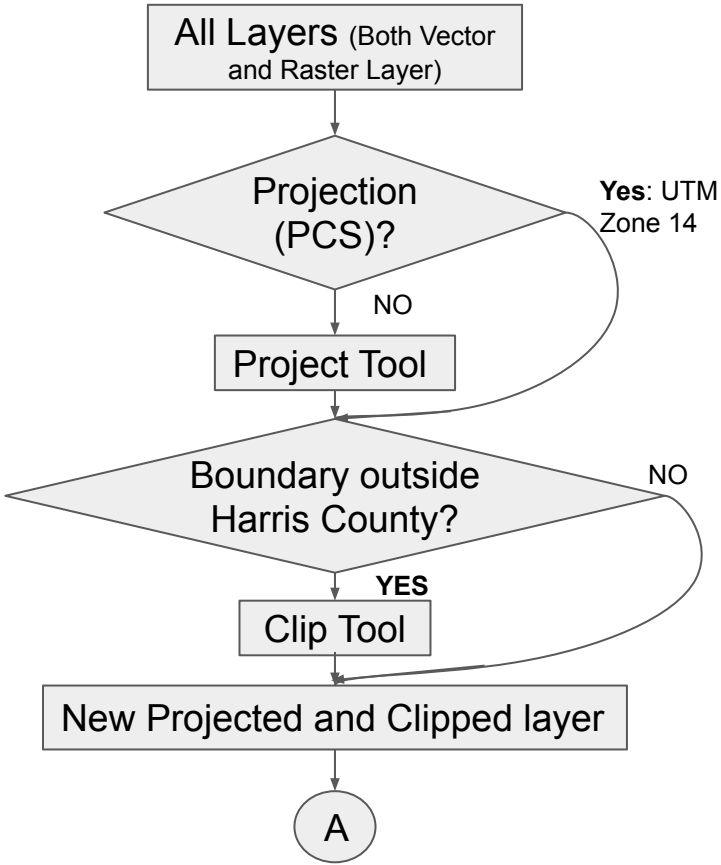
- Sentinel_B1_CH4_Harris
  - Source: Esri, European Space Agency - ESA
  - Data Type: **Raster** Feature Class
  - GCS: WGS 1984
  - PCS: NA
  - Methane gas concentration

- Heat_Severity_Unit_Harris
  - Source: Esri, European Space Agency - ESA
  - Data Type: **Raster** Feature Class
  - GCS: WGS 1984
  - PCS: NA

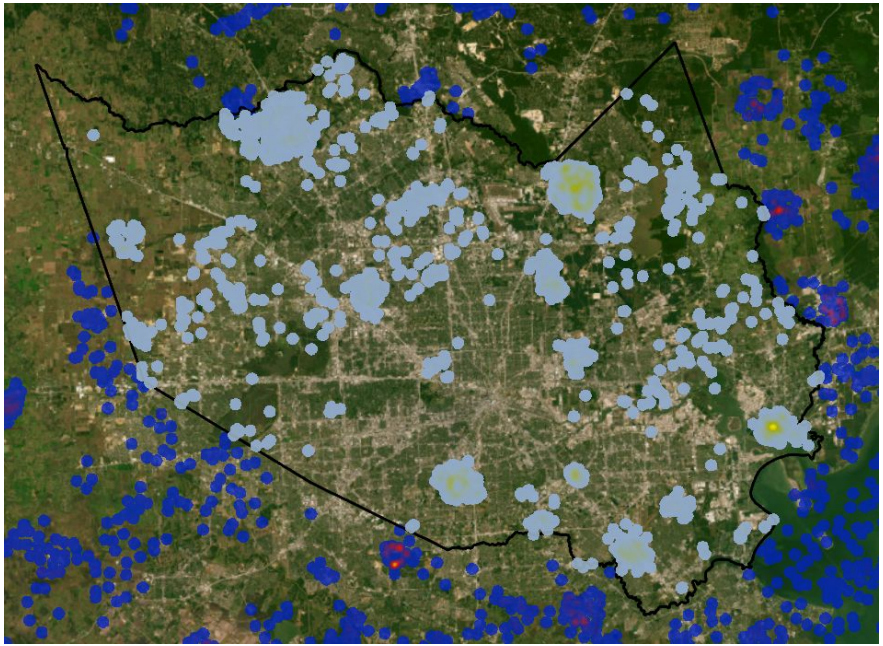
Methodology





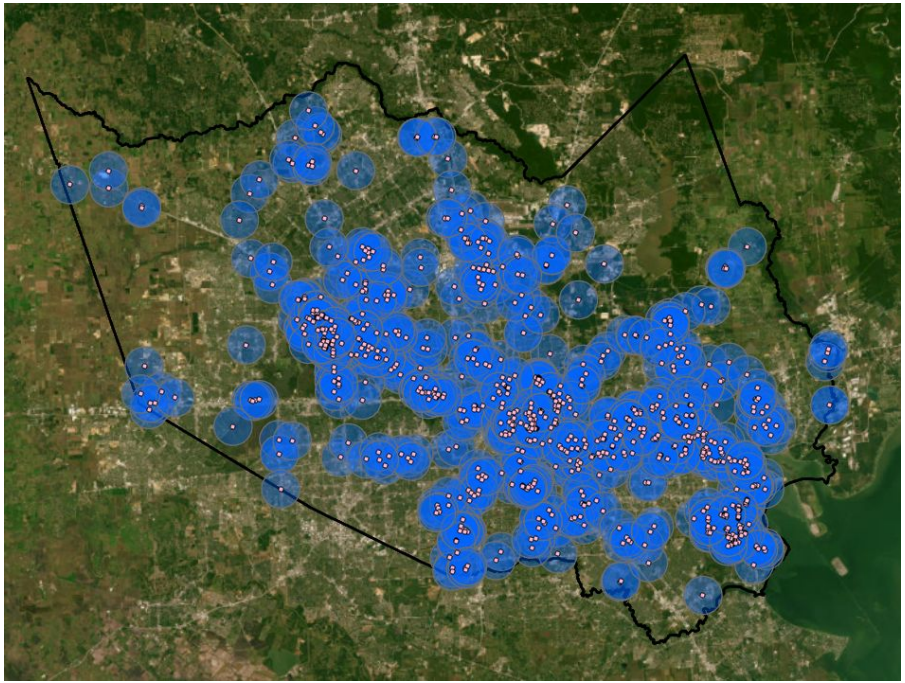


Visualization of Vector Data

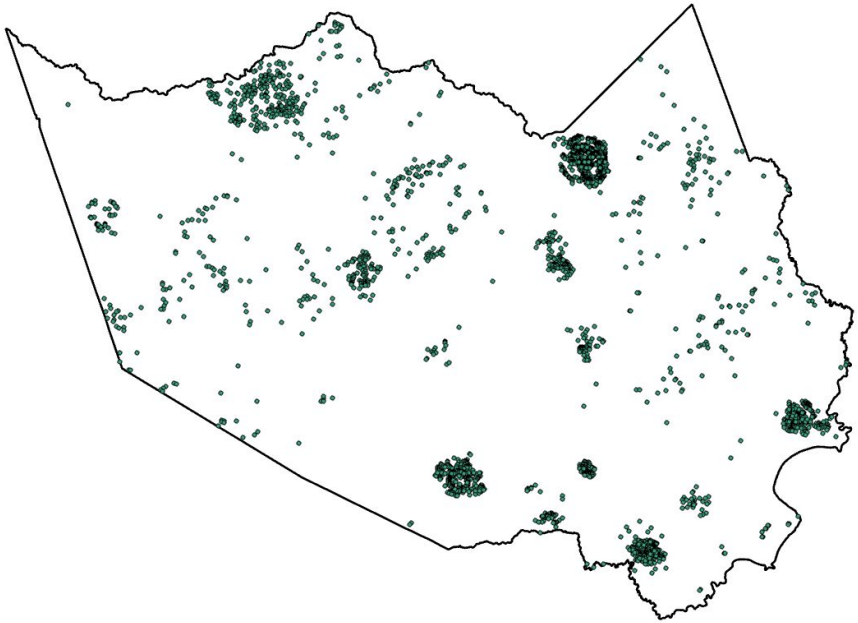


Example of Clip Tool
(Fracking Wells)

Example of Buffer
(Industrial Area)

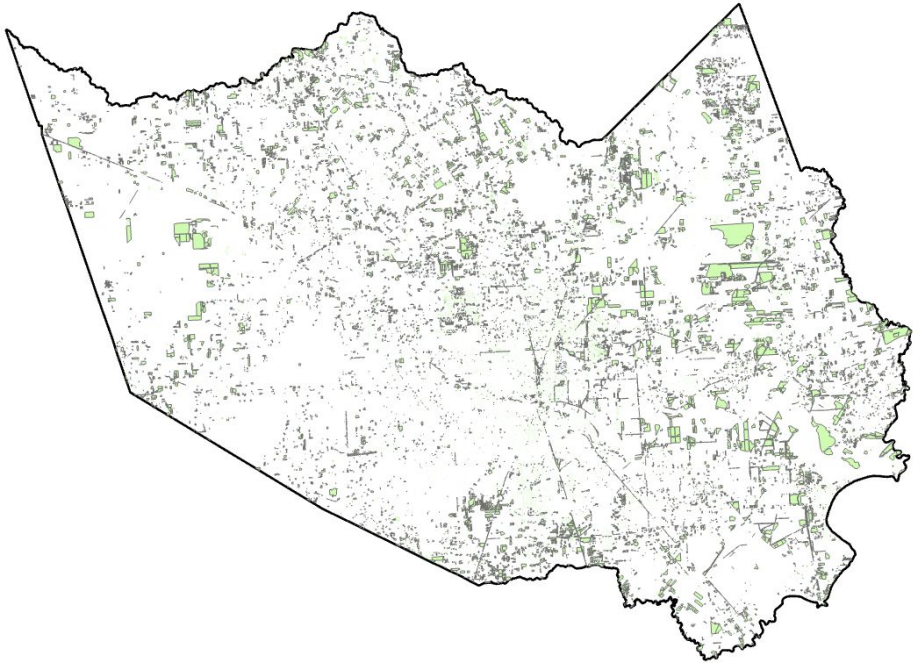


Visualization of Vector Data



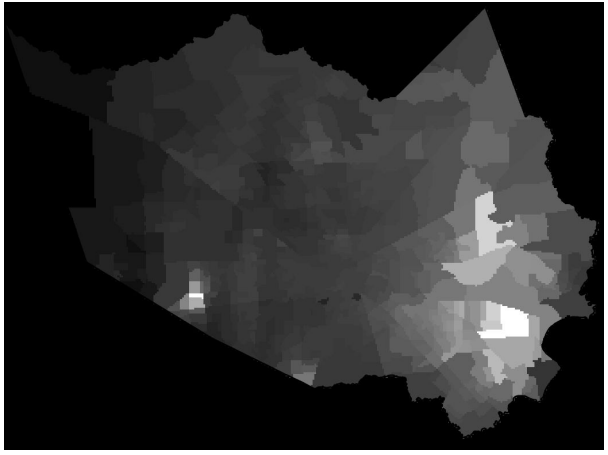
Example of Clip Tool
(Fracking Wells)

Undeveloped land

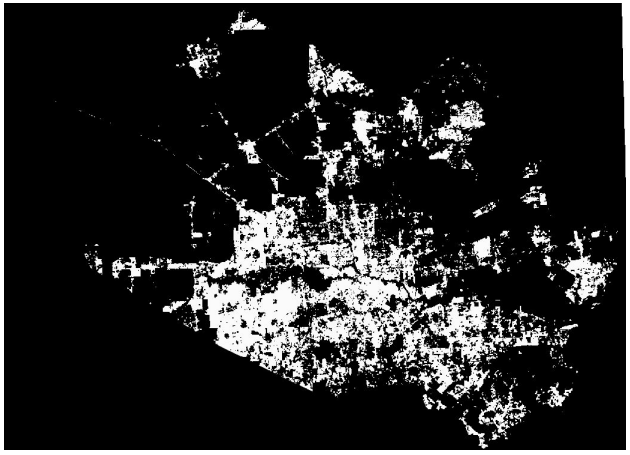


Visualization of Raster Data

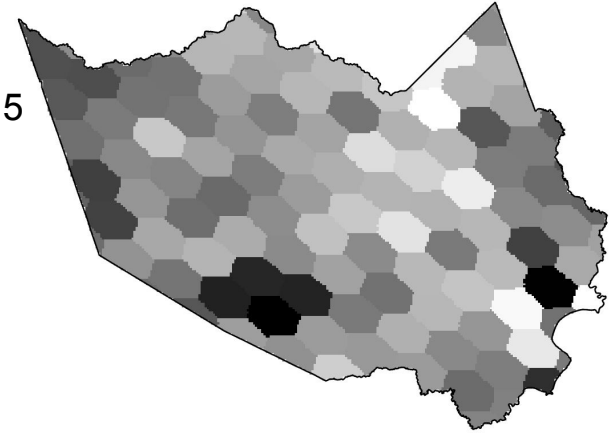
Air Toxicity Raster Layer



Heat Severity Raster Layer

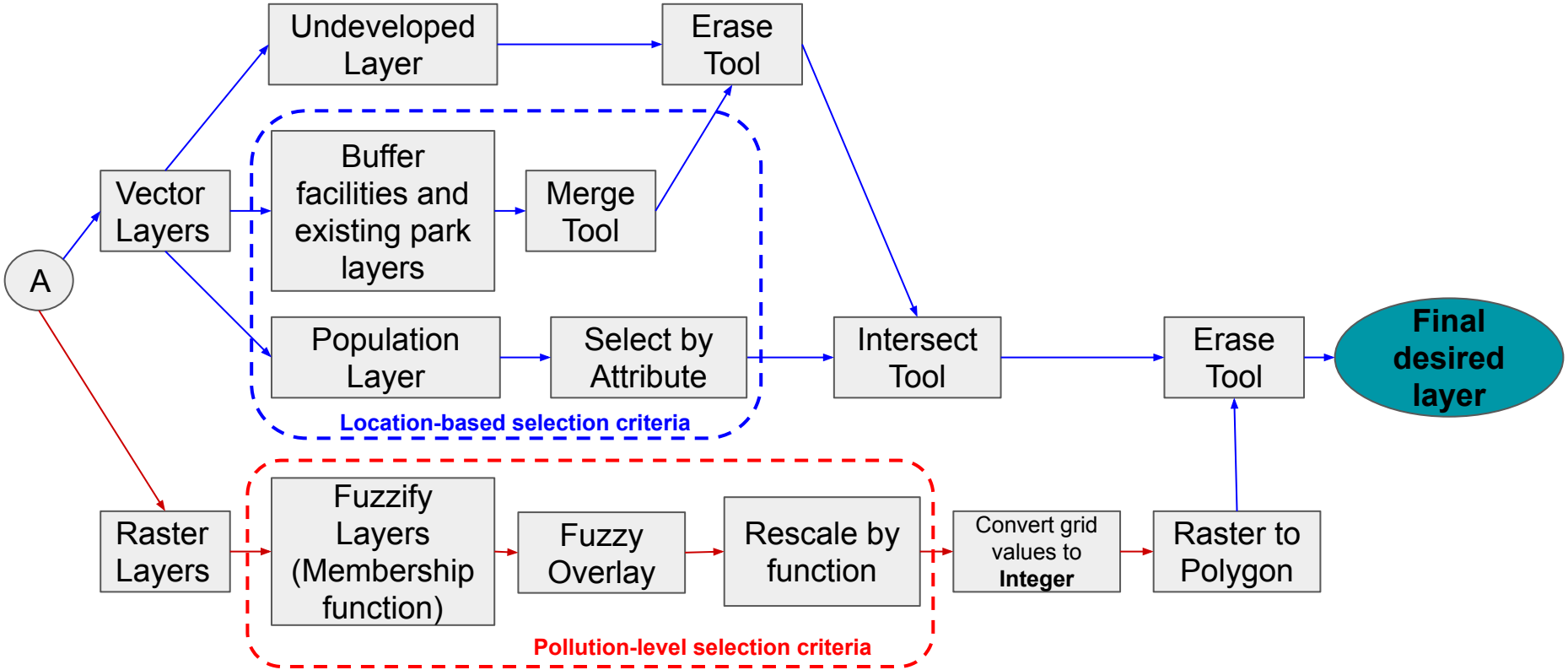


Average PM 2.5 Raster Layer



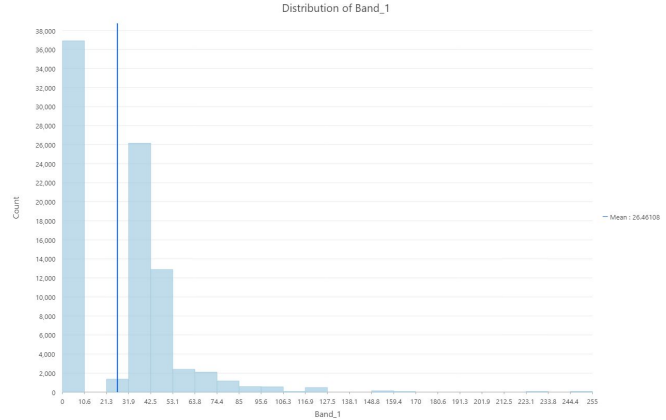
Satellite CH4 Raster Layer

Methodology (Cont'n..)

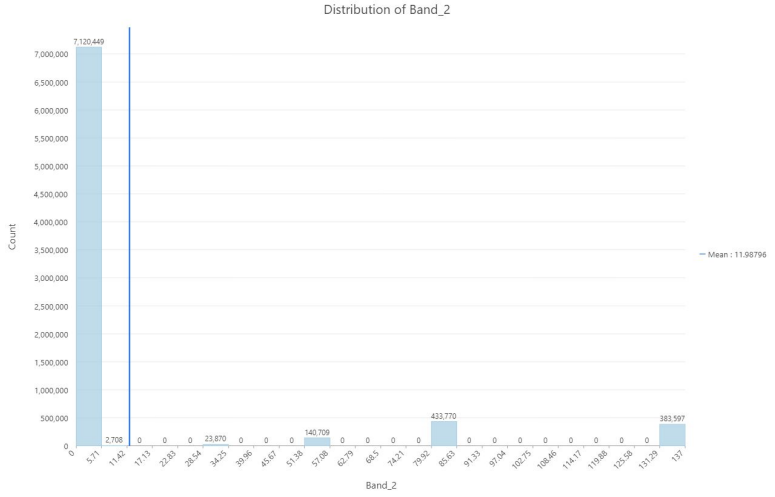


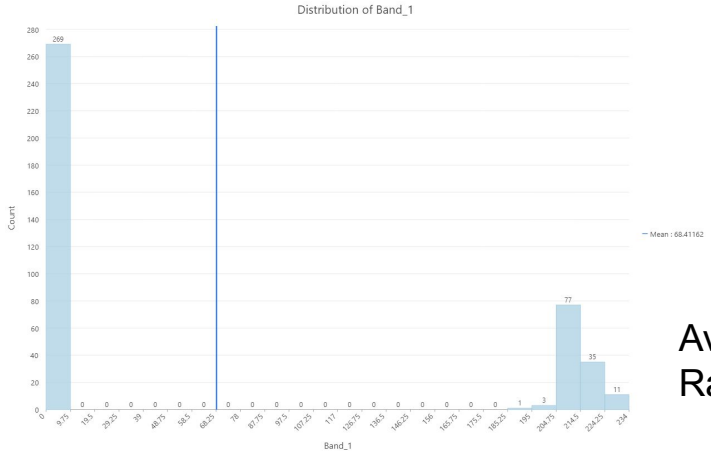
Raster Data Histogram

Air Toxicity Raster Layer



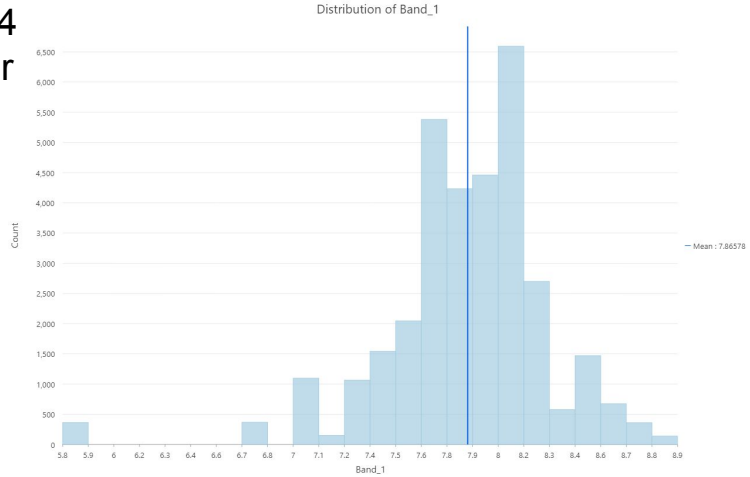
Heat Severity Raster Layer





Average PM 2.5 Raster Layer

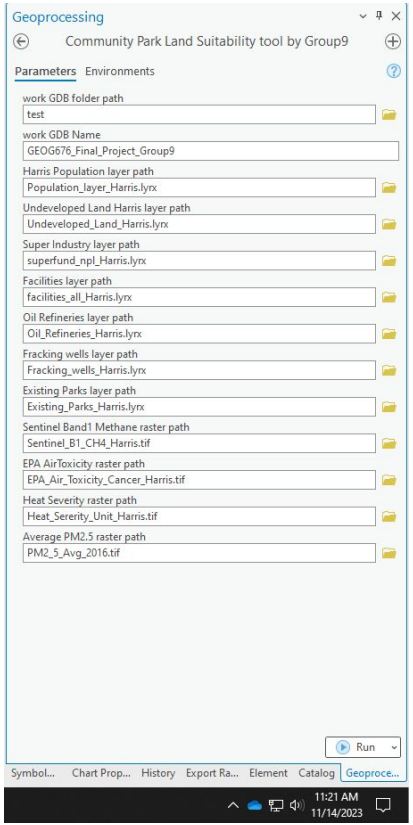
Satellite CH4 Raster Layer

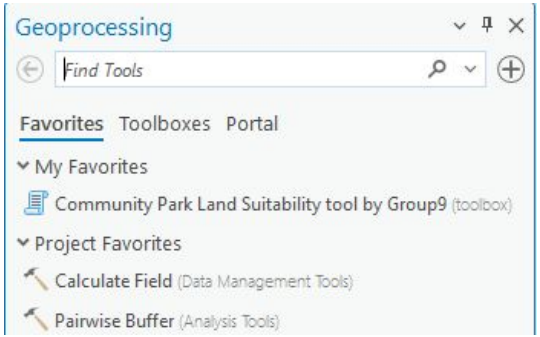


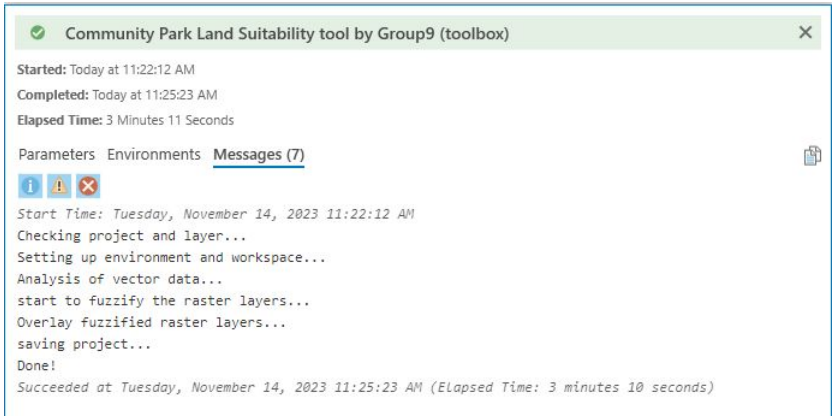
What has been done?
Custom Toolbox

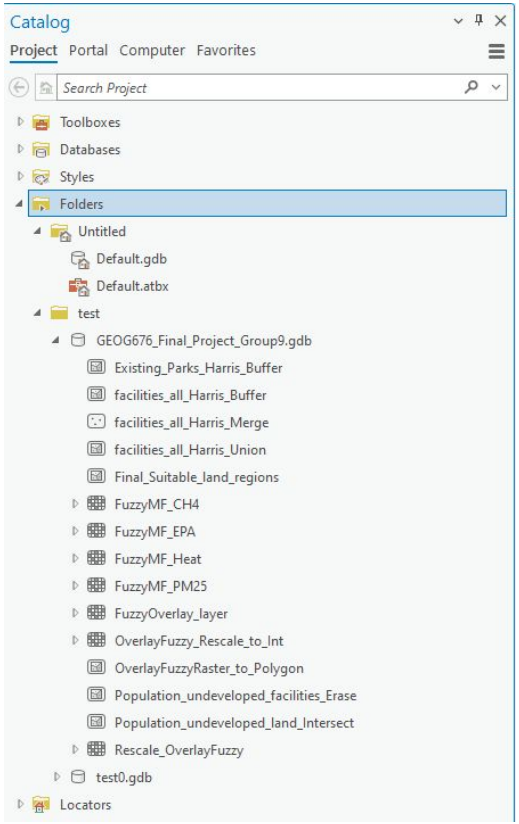
- ArcGIS Pro based **Python Toolbox** used for **programming and analysing** the GIS data for the project.
- **ArcPy, OS,** and **Time** module called as a part of programming.
- Workspace location and overwrite output set.
- Check for necessary license was performed.
- Tool was labelled : Community Park Land Suitability tool by Group9
- Total of 12 parameters were set and called.
- Progressor and Messages were added to python toolbox.

Developed Toolbox Working Demonstration

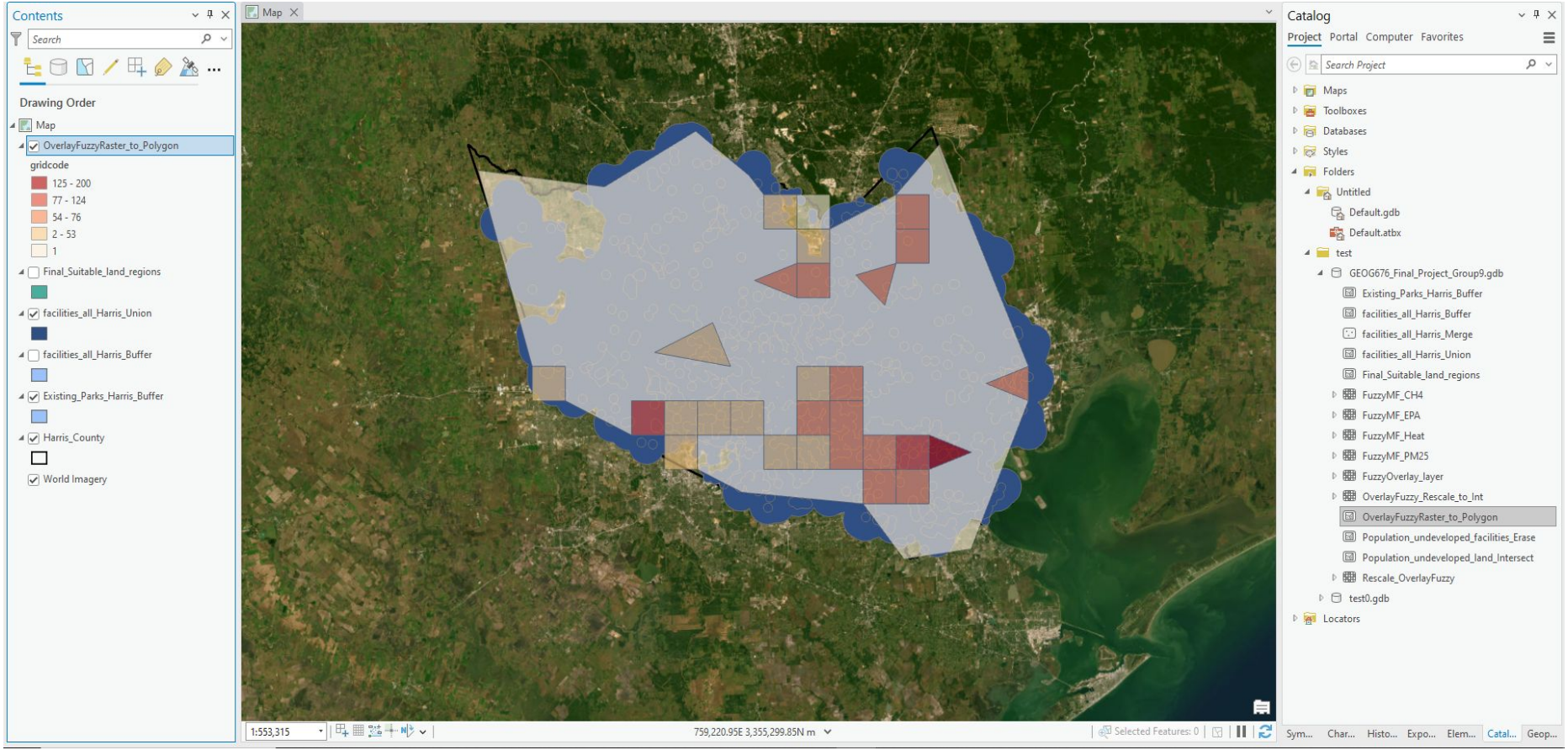








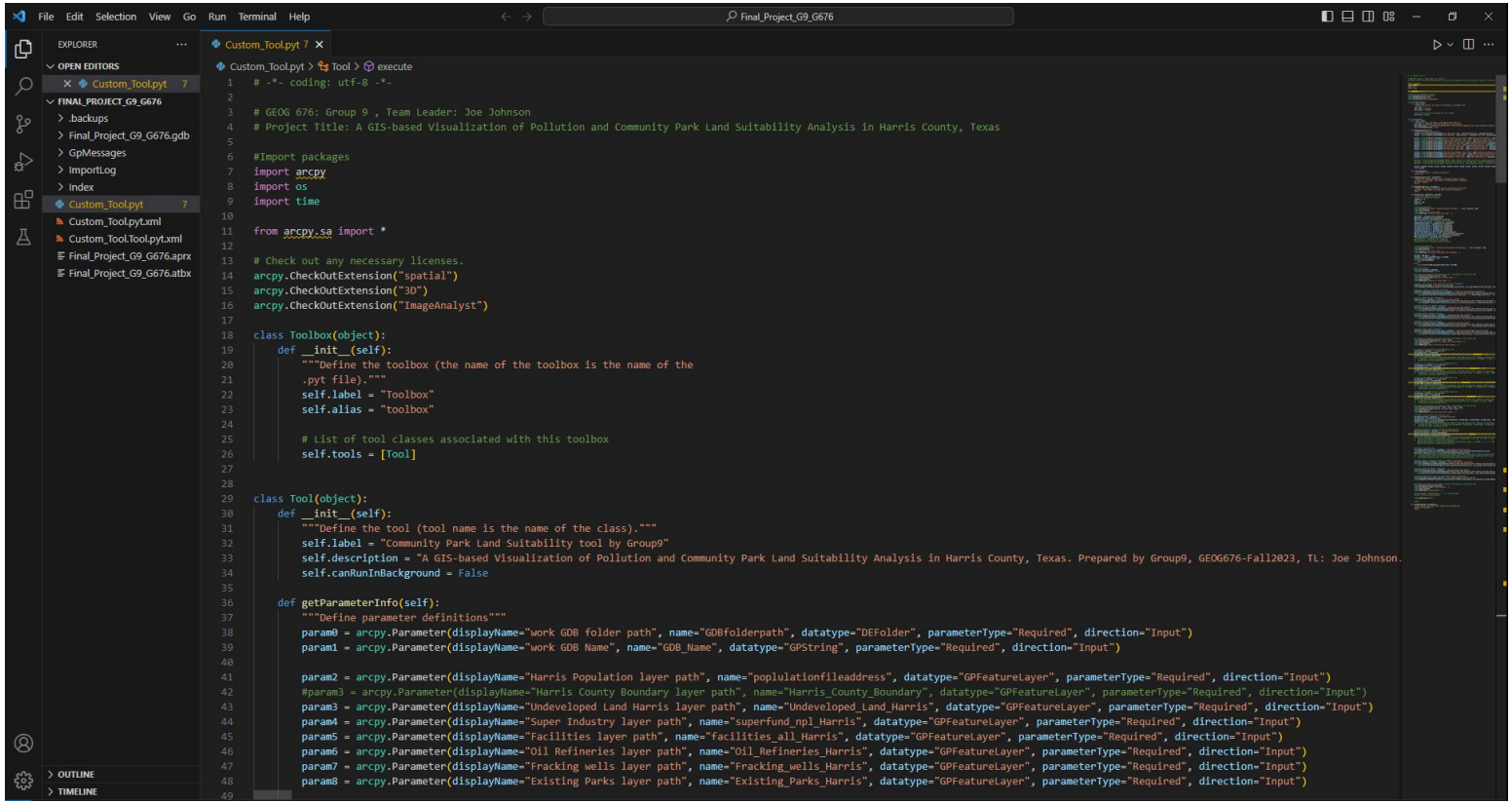
Results: Industrial zone buffer layer and Fuzzy logic-based Air Pollution Risk layer



Result: Final Layer Visualization

- Final layer considers all the **predefined conditions** while selecting the region.
- It takes **less than 5 minutes** from loading the required data, processing and to generating the output.
- Every step is **trackable** using progressor and messages.
- Developed python toolbox: **General purpose toolbox** which can be used for any region of the world with similar input dataset.

Python Toolbox code



```python
# -*- coding: utf-8 -*-

# GEOG 676: Group 9 , Team Leader: Joe Johnson
# Project Title: A GIS-based Visualization of Pollution and Community Park Land Suitability Analysis in Harris County, Texas

#Import packages
import arcpy
import os
import time

from arcpy.sa import *

# Check out any necessary licenses.
arcpy.CheckOutExtension("spatial")
arcpy.CheckOutExtension("3D")
arcpy.CheckOutExtension("ImageAnalyst")

class Toolbox(object):
    def __init__(self):
        """Define the toolbox (the name of the toolbox is the name of the
        .pyt file)."""
        self.label = "Toolbox"
        self.alias = "toolbox"

        # List of tool classes associated with this toolbox
        self.tools = [Tool]


class Tool(object):
    def __init__(self):
        """Define the tool (tool name is the name of the class)."""
        self.label = "Community Park Land Suitability tool by Group9"
        self.description = "A GIS-based Visualization of Pollution and Community Park Land Suitability Analysis in Harris County, Texas. Prepared by Group9, GEOG676-Fall2023, TL: Joe Johnson."
        self.canRunInBackground = False

    def getParameterInfo(self):
        """Define parameter definitions"""
        param0 = arcpy.Parameter(displayName="work GDB folder path", name="GDBfolderpath", datatype="DEFolder", parameterType="Required", direction="Input")
        param1 = arcpy.Parameter(displayName="work GDB Name", name="GDB_Name", datatype="GPString", parameterType="Required", direction="Input")

        param2 = arcpy.Parameter(displayName="Harris Population layer path", name="poplulationfileaddress", datatype="GPFeatureLayer", parameterType="Required", direction="Input")
        #param3 = arcpy.Parameter(displayName="Harris County Boundary layer path", name="Harris_County_Boundary", datatype="GPFeatureLayer", parameterType="Required", direction="Input")
        param3 = arcpy.Parameter(displayName="Undeveloped Land Harris layer path", name="Undeveloped_Land_Harris", datatype="GPFeatureLayer", parameterType="Required", direction="Input")
        param4 = arcpy.Parameter(displayName="Super Industry layer path", name="superfund_npl_Harris", datatype="GPFeatureLayer", parameterType="Required", direction="Input")
        param5 = arcpy.Parameter(displayName="Facilities layer path", name="facilities_all_Harris", datatype="GPFeatureLayer", parameterType="Required", direction="Input")
        param6 = arcpy.Parameter(displayName="Oil Refineries layer path", name="Oil_Refineries_Harris", datatype="GPFeatureLayer", parameterType="Required", direction="Input")
        param7 = arcpy.Parameter(displayName="Fracking wells layer path", name="Fracking_wells_Harris", datatype="GPFeatureLayer", parameterType="Required", direction="Input")
        param8 = arcpy.Parameter(displayName="Existing Parks layer path", name="Existing_Parks_Harris", datatype="GPFeatureLayer", parameterType="Required", direction="Input")
```

Python Toolbox code (Cont..)

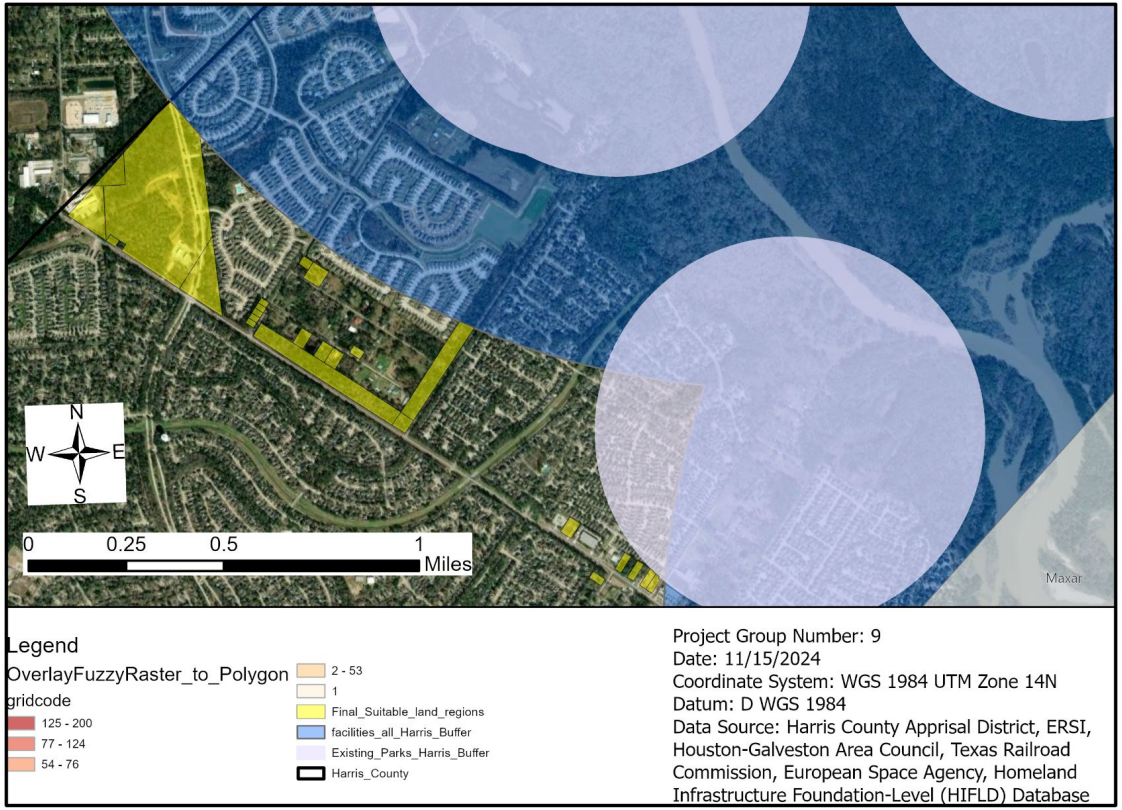
```python
def execute(self, parameters, messages):
    """The source code of the tool."""
    # Define our progressor variables
    readTime = 2.5
    start = 0
    maximum = 100
    step = 20

    # Setup the progressor
    arcpy.SetProgressor("step", "Checking project and layer...", start, maximum, step)
    time.sleep(readTime)
    # Add message to the results pane
    arcpy.AddMessage("Checking project and layer...")

    GDB_Folder = parameters[0].valueAsText
    GDB_Name = parameters[1].valueAsText
    popln_layer_Harris = parameters[2].valueAsText
    #Harris_County_Boundary = parameters[3].valueAsText
    Undeveloped_Land_Harris = parameters[3].valueAsText
    superfund_npl_Harris = parameters[4].valueAsText
    facilities_all_Harris = parameters[5].valueAsText
    Oil_Refineries_Harris = parameters[6].valueAsText
    Fracking_wells_Harris = parameters[7].valueAsText
    Existing_Parks_Harris = parameters[8].valueAsText
    Sentinel_B1_CH4_Harris_tif = parameters[9].valueAsText
    EPA_Air_Toxicity_Cancer_Harris_tif = parameters[10].valueAsText
    Heat_Sererity_Unit_Harris_tif = parameters[11].valueAsText
    PM2_5_Avg_2016_tif = parameters[12].valueAsText
    #bufferRadius1 = parameters[14].valueAsText
    #bufferRadius2 = parameters[15].valueAsText
    #populationfilter = parameters[16].valueAsText


    # Setup the progressor
    arcpy.SetProgressor("step", "Setting up environment and workspace...", start, maximum, step)
    time.sleep(readTime)
    # Add message to the results pane
    arcpy.AddMessage("Setting up environment and workspace...")

    WorkGDB = GDB_Name + ".gdb"
    database = os.path.join(GDB_Folder, WorkGDB)
    arcpy.env.overwriteOutput = True
    if arcpy.Exists(database):
```

```python
    #Set the workspace
    arcpy.env.workspace = database
    arcpy.env.overwriteOutput = False

    #Increment the progressor and change the label; add message to the results pane
    arcpy.SetProgressorPosition(start + step)
    arcpy.SetProgressorLabel("Analysis of vector data...")
    time.sleep(readTime)
    arcpy.AddMessage("Analysis of vector data...")

    # Process: Make Feature Layer (Make Feature Layer) (management)
    Population_GT_10K_layer = "Population_GT_10K_layer"
    arcpy.management.MakeFeatureLayer(in_features=popln_layer_Harris, out_layer=Population_GT_10K_layer, where_clause="POP2010 >= 10000")

    # Process: Intersect (Intersect) (analysis)
    Population_undeveloped_land_Intersect = database + "/Population_undeveloped_land_Intersect"
    with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"G
        arcpy.analysis.Intersect(in_features=[Population_GT_10K_layer, ""], Undeveloped_Land_Harris, ""]], out_feature_class=Population_undeveloped_land_Intersect)

    # Process: Merge (Merge) (management)
    Output_Dataset = database + "/facilities_all_Harris_Merge"
    with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"G
        arcpy.management.Merge(inputs=[facilities_all_Harris, Oil_Refineries_Harris, superfund_npl_Harris, Fracking_wells_Harris], output=Output_Dataset, field_mappings="FACN \"FACN\" tr

    # Process: Buffer (2) (Buffer) (analysis)
    facilities_all_Harris_Buffer = database + "/facilities_all_Harris_Buffer"
    with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"G
        arcpy.analysis.Buffer(in_features=Output_Dataset, out_feature_class=facilities_all_Harris_Buffer, buffer_distance_or_field= "2 Miles", dissolve_option="ALL")

    # Process: Buffer (Buffer) (analysis)
    Existing_Parks_Harris_Buffer = database + "/Existing_Parks_Harris_Buffer"
    with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"G
        arcpy.analysis.Buffer(in_features=Existing_Parks_Harris, out_feature_class=Existing_Parks_Harris_Buffer, buffer_distance_or_field= "0.5 Miles", dissolve_option="ALL")

    # Process: Union (Union) (analysis)
    facilities_all_Harris_Union = database + "/facilities_all_Harris_Union"
    with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"G
        arcpy.analysis.Union(in_features=[facilities_all_Harris_Buffer, ""], [Existing_Parks_Harris_Buffer, ""]], out_feature_class=facilities_all_Harris_Union, gaps="NO_GAPS")

    # Process: Erase (Erase) (analysis)
    Population_undeveloped_facilities_Erase = database + "/Population_undeveloped_facilities_Erase"
    with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"G
        arcpy.analysis.Erase(in_features=Population_undeveloped_land_Intersect, erase_features=facilities_all_Harris_Union, out_feature_class=Population_undeveloped_facilities_Erase)
```

```python
    #Increment the progressor and change the label; add message to the results pane
    arcpy.SetProgressorPosition(start + step + step)
    arcpy.SetProgressorLabel("start to fuzzify the raster layers...")
    time.sleep(readTime)
    arcpy.AddMessage("start to fuzzify the raster layers...")


    # Process: Fuzzy Membership (Fuzzy Membership) (sa)
    FuzzyMF_EPA = database + "/FuzzyMF_EPA"
    Fuzzy_Membership = FuzzyMF_EPA
    FuzzyMF_EPA = arcpy.sa.FuzzyMembership(EPA_Air_Toxicity_Cancer_Harris_tif, FuzzyLinear(0, 255))
    FuzzyMF_EPA.save(Fuzzy_Membership)
    #with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"
    #    FuzzyMF_EPA = arcpy.sa.FuzzyMembership(EPA_Air_Toxicity_Cancer_Harris_tif, [["LINEAR", 0, 255]], "NONE")
    #    FuzzyMF_EPA.save(Fuzzy_Membership)

    # Process: Fuzzy Membership (2) (Fuzzy Membership) (sa)
    FuzzyMF_Heat = database + "/FuzzyMF_Heat"
    Fuzzy_Membership_2_ = FuzzyMF_Heat
    FuzzyMF_Heat = arcpy.sa.FuzzyMembership(Heat_Sererity_Unit_Harris_tif, FuzzyLinear(0, 245))
    FuzzyMF_Heat.save(Fuzzy_Membership_2_)
    #with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"
    #    FuzzyMF_Heat = arcpy.sa.FuzzyMembership(Heat_Sererity_Unit_Harris_tif, [["LINEAR", 0, 245]], "NONE")
    #    FuzzyMF_Heat.save(Fuzzy_Membership_2_)

    # Process: Fuzzy Membership (3) (Fuzzy Membership) (sa)
    FuzzyMF_PM25 = database + "/FuzzyMF_PM25"
    Fuzzy_Membership_3_ = FuzzyMF_PM25
    FuzzyMF_PM25 = arcpy.sa.FuzzyMembership(PM2_5_Avg_2016_tif, FuzzyLinear(5.7755103111267, 8.9484844207764))
    FuzzyMF_PM25.save(Fuzzy_Membership_3_)
    #with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"
    #    FuzzyMF_PM25 = arcpy.sa.FuzzyMembership(PM2_5_Avg_2016_tif, [["LINEAR", 5.7755103111267, 8.9484844207764]], "NONE")
    #    FuzzyMF_PM25.save(Fuzzy_Membership_3_)

    # Process: Fuzzy Membership (4) (Fuzzy Membership) (sa)
    FuzzyMF_CH4 = database + "/FuzzyMF_CH4"
    Fuzzy_Membership_4_ = FuzzyMF_CH4
    FuzzyMF_CH4 = arcpy.sa.FuzzyMembership(Sentinel_B1_CH4_Harris_tif, FuzzyLinear(0, 234))
    FuzzyMF_CH4.save(Fuzzy_Membership_4_)
    #with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"
    #    FuzzyMF_CH4 = arcpy.sa.FuzzyMembership(Sentinel_B1_CH4_Harris_tif, [["LINEAR", 0, 234]], "NONE")
    #    FuzzyMF_CH4.save(Fuzzy_Membership_4_)

    #Increment the progressor and change the label; add message to the results pane
    arcpy.SetProgressorPosition(start + step + step + step + step)
    arcpy.SetProgressorLabel("Overlay fuzzified raster layers...")
    time.sleep(readTime)
```

```python
    arcpy.AddMessage("Overlay fuzzified raster layers...")

    # Process: Fuzzy Overlay (Fuzzy Overlay) (sa)
    FuzzyOverlay_layer = database + "/FuzzyOverlay_layer"
    Fuzzy_Overlay = FuzzyOverlay_layer
    FuzzyOverlay_layer = arcpy.sa.FuzzyOverlay([FuzzyMF_EPA, FuzzyMF_Heat, FuzzyMF_PM25, FuzzyMF_CH4], "AND", 0.9)
    FuzzyOverlay_layer.save(Fuzzy_Overlay)
    #with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"
    #    FuzzyOverlay_layer = arcpy.sa.FuzzyOverlay([FuzzyMF_EPA, FuzzyMF_Heat, FuzzyMF_PM25, FuzzyMF_CH4], "AND", 0.9)
    #    FuzzyOverlay_layer.save(Fuzzy_Overlay)

    # Process: Rescale by Function (Rescale by Function) (sa)
    Rescale_OverlayFuzzy = database + "/Rescale_OverlayFuzzy"
    Rescale_by_Function = Rescale_OverlayFuzzy
    Rescale_OverlayFuzzy = arcpy.sa.RescaleByFunction(FuzzyOverlay_layer, TfLinear(0, 7, "#", "#", "#", "#"), 1, 200)
    Rescale_OverlayFuzzy.save(Rescale_by_Function)

    # Process: Int (Int) (3d)
    OverlayFuzzy_Rescale_to_Int = database + "/OverlayFuzzy_Rescale_to_Int"
    arcpy.ddd.Int(in_raster_or_constant=Rescale_OverlayFuzzy, out_raster=OverlayFuzzy_Rescale_to_Int)
    OverlayFuzzy_Rescale_to_Int = arcpy.Raster(OverlayFuzzy_Rescale_to_Int)
    #with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"
    #    arcpy.ddd.Int(in_raster_or_constant=Rescale_OverlayFuzzy, out_raster=OverlayFuzzy_Rescale_to_Int)
    #    OverlayFuzzy_Rescale_to_Int = arcpy.Raster(OverlayFuzzy_Rescale_to_Int)

    # Process: Raster to Polygon (Raster to Polygon) (conversion)
    OverlayFuzzyRaster_to_Polygon = database + "/OverlayFuzzyRaster_to_Polygon"
    with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"G
        arcpy.conversion.RasterToPolygon(in_raster=OverlayFuzzy_Rescale_to_Int, out_polygon_features=OverlayFuzzyRaster_to_Polygon)

    # Process: Erase (2) (Erase) (analysis)
    Final_Suitable_land_regions = database + "/Final_Suitable_land_regions"
    with arcpy.EnvManager(outputCoordinateSystem="PROJCS[\"WGS_1984_UTM_Zone_14N\",GEOGCS[\"GCS_WGS_1984\",DATUM[\"D_WGS_1984\",SPHEROID[\"WGS_1984\",6378137.0,298.257223563]],PRIMEM[\"G
        arcpy.analysis.Erase(in_features=Population_undeveloped_facilities_Erase, erase_features=OverlayFuzzyRaster_to_Polygon, out_feature_class=Final_Suitable_land_regions)

    # Process: Make Feature Layer (2) (Make Feature Layer) (management)
    Final_btw30_150Acres_suitable_regions = "Final_btw30_150Acres_suitable_regions"
    arcpy.management.MakeFeatureLayer(in_features=Final_Suitable_land_regions, out_layer=Final_btw30_150Acres_suitable_regions, where_clause="Shape_Area >= 210 And Shape_Area < 1000")


    #Increment the progressor and change the label; add message to the results pane
    arcpy.SetProgressorPosition(maximum)
    arcpy.SetProgressorLabel("Saving project...")
    time.sleep(readTime)
    arcpy.AddMessage("saving project...")

    arcpy.AddMessage("Done!")
```

A GIS-based Visualization of Pollution and Community Park Land Suitability Analysis in Harris County, Texas



Questions?