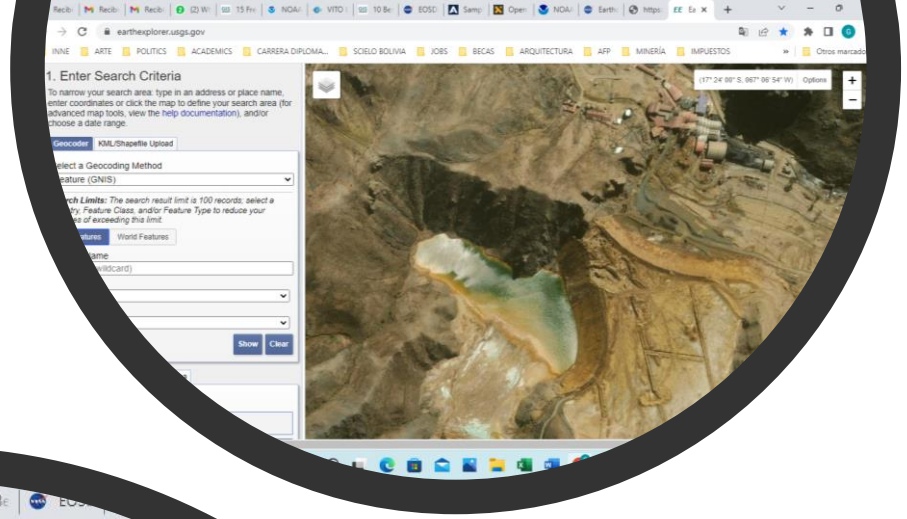
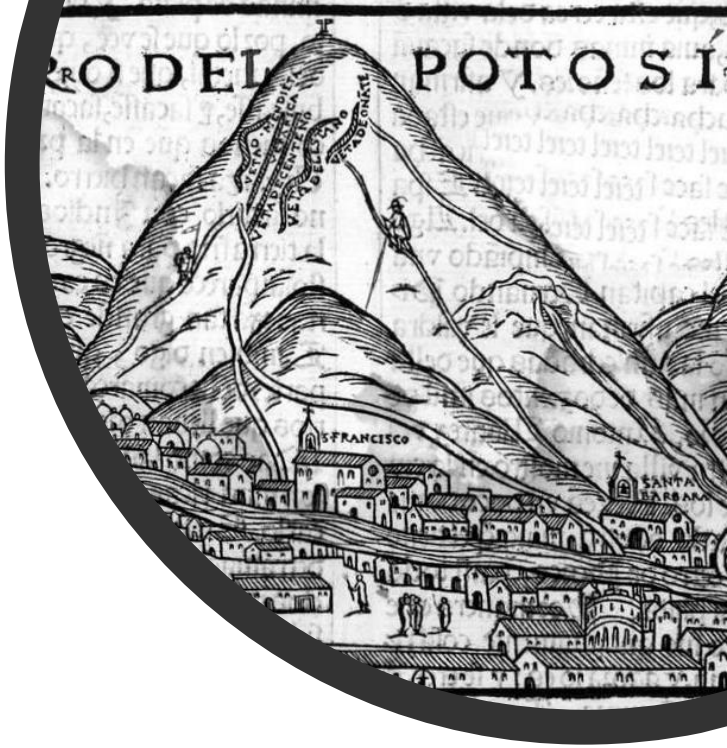
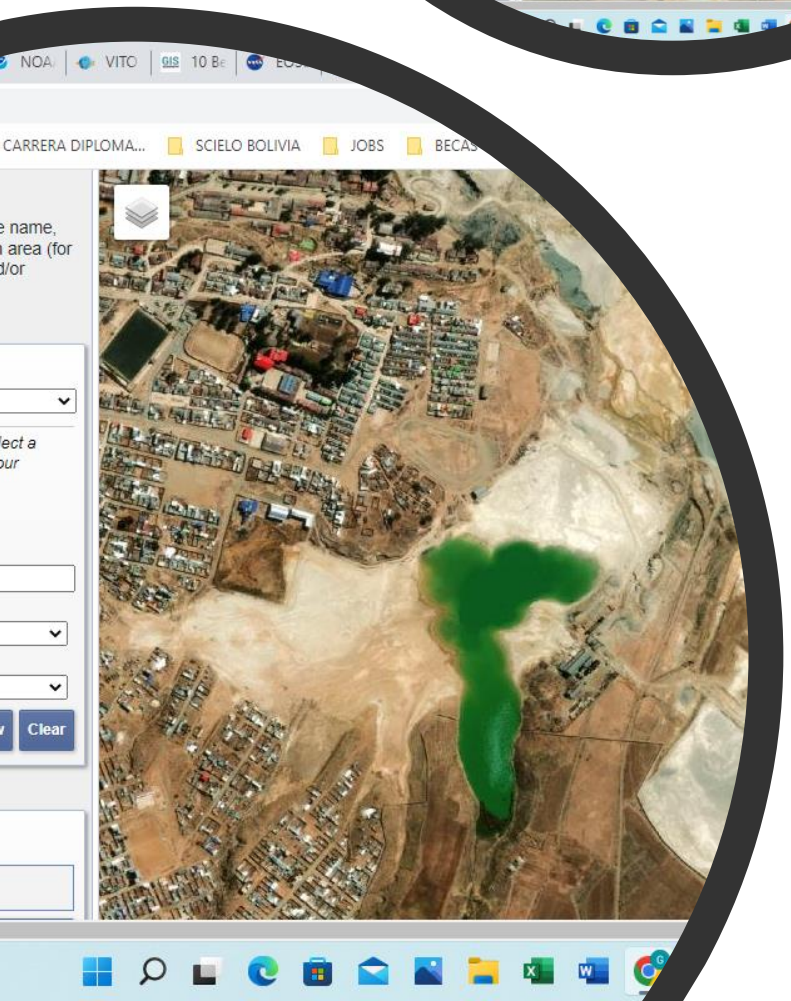
Identificación satelital de pasivos ambientales mineros en Bolivia ISPAM







Problema: 1545

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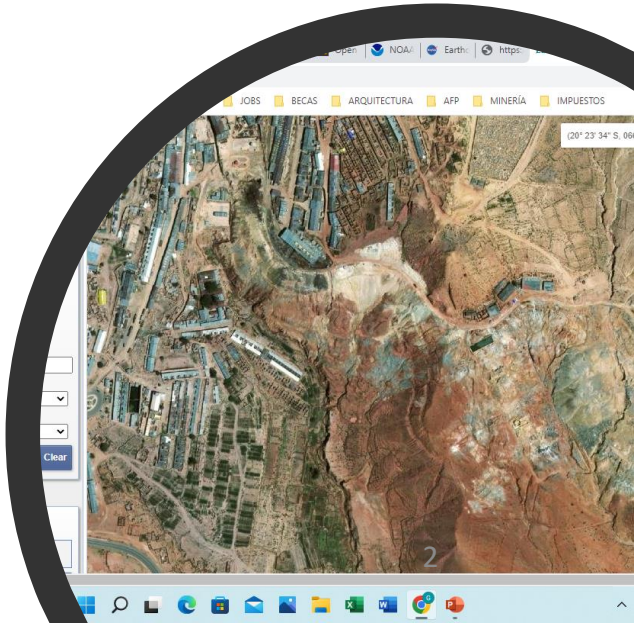

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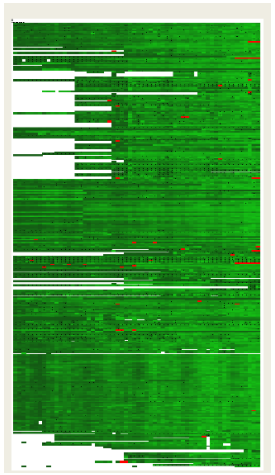
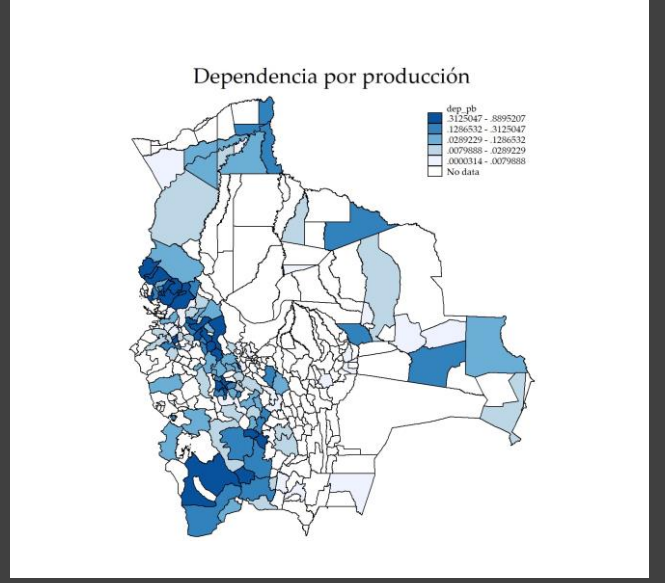
- Dr. Guillermo Guzmán Prudencio

- Dr. Ariel Zeballos

- Ing. Adrián Villarroel

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.0079888 - .0299229
.0000314 - .0079888
No data

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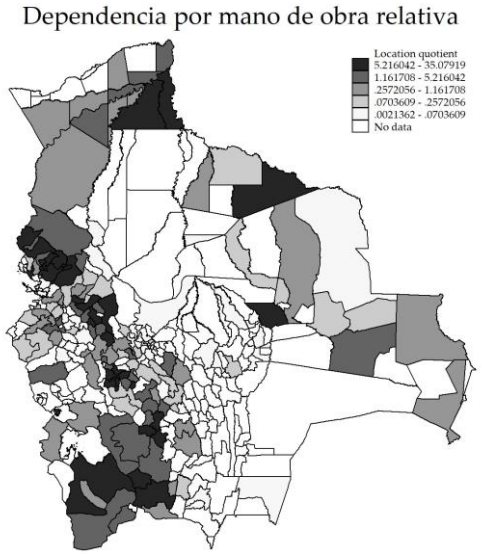
Dependencia por mano de obra relativa
Location quotient
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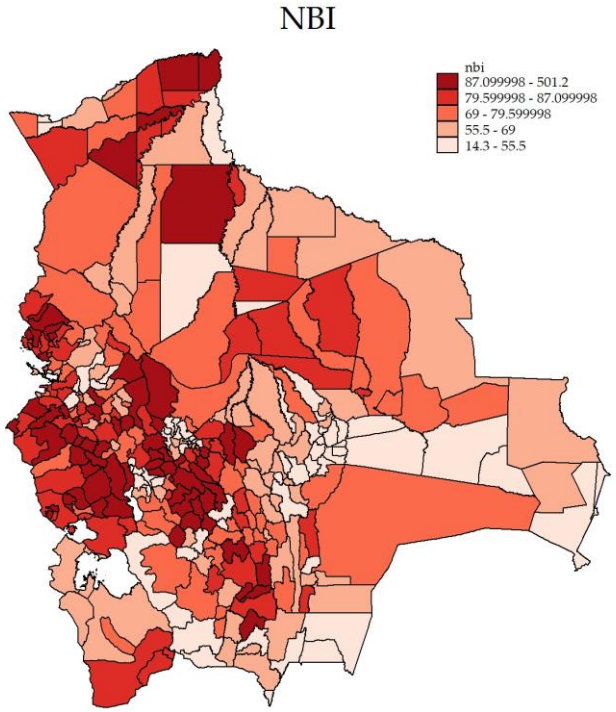
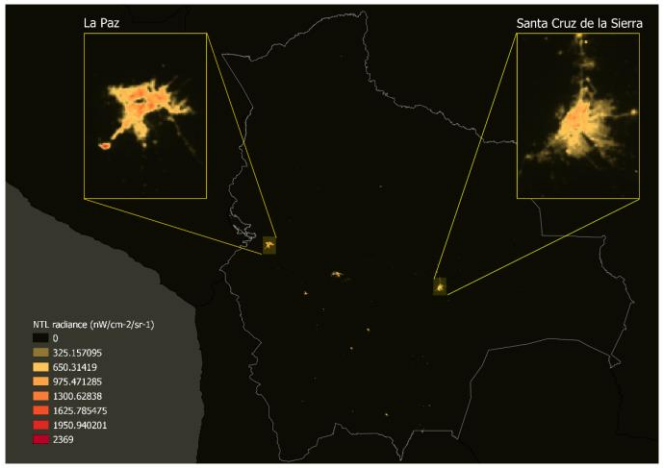

NBI
nbi
87.099998 - 501.2
79.599998 - 87.099998
69 - 79.599998
55.5 - 69
14.3 - 55.5


La Paz
Santa Cruz de la Sierra
NTL radiance (nW/cm-2/sr-1)
0
325.157095
650.31419
975.471285
1300.62838
1625.785475
1950.940201
2369

Research: revisión bibliográfica ISPAM

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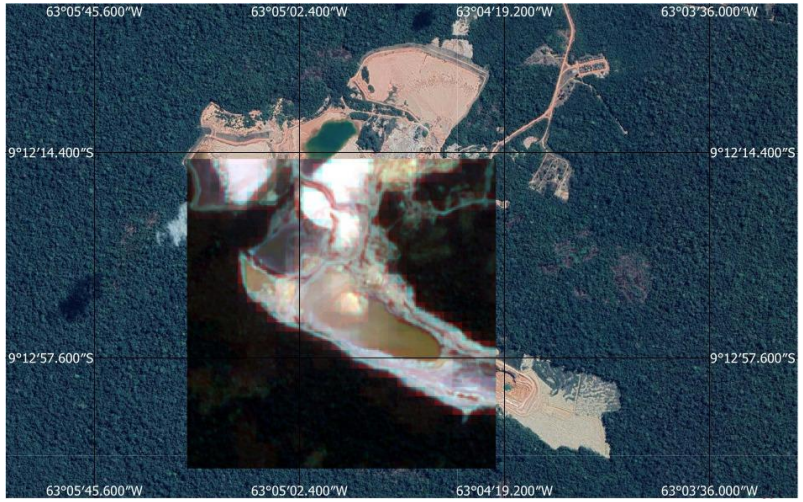
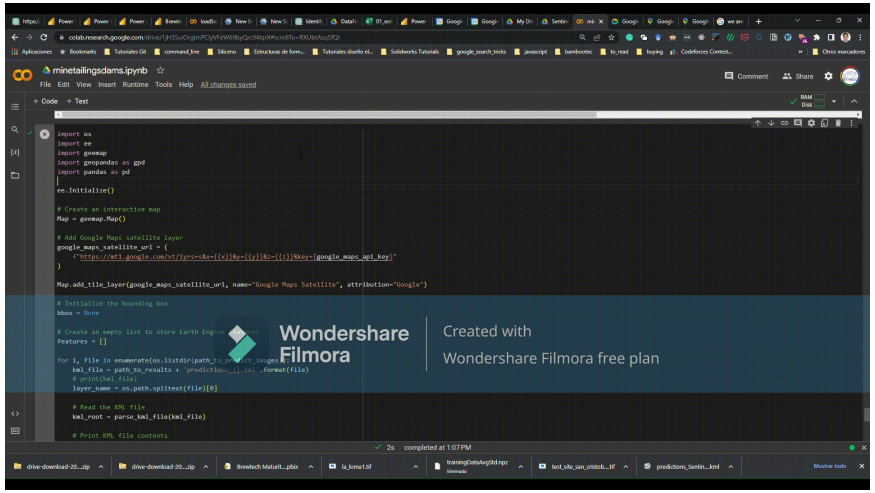
El algoritmo: ***Visual Pattern Mining*** (VPM)

IA-ML

- **Fase 1 (Morfológica)**: el algoritmo recibe el parche que indica que un subconjunto de esa imagen es el objeto que se busca, entonces el algoritmo clasifica partes del parche como pertenecientes al objeto de interés o no.
- **Fase 2 (Macro morfológica)**: el algoritmo establece relaciones espaciales entre estas partes clasificadas para formar el objeto de interés y clasificarlo correctamente en su totalidad.
- **Fase 3 (Espectrométrica):** Para evaluar el impacto, se tiene un segundo modelo que sólo indica si la espectrometría corresponde a un elemento que tiene alto, medio o bajo impacto. (12 bandas espectrales)

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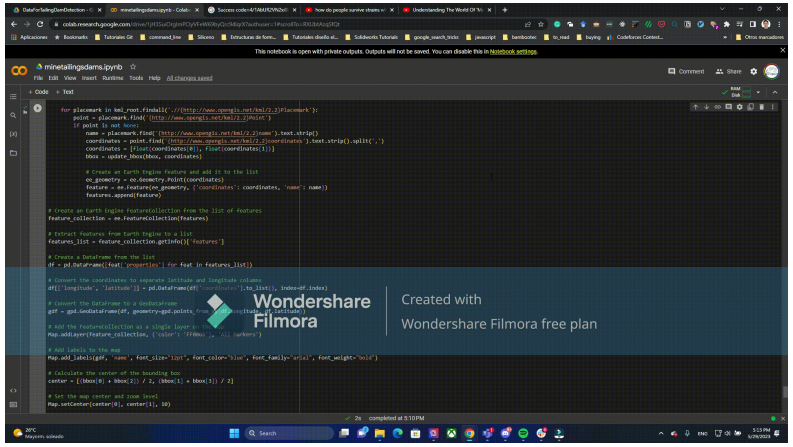
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RAM Disk

```
import os
import ee
import geemap
import geopandas as gpd
import pandas as pd

ee.Initialize()

# Create an interactive map
Map = geemap.Map()

# Add Google Maps satellite layer
google_maps_satellite_url = (
    f"https://mt1.google.com/vt/lyrs=s&x={{x}}&y={{y}}&z={{z}}&key={google_maps_api_key}"
)

Map.add_tile_layer(google_maps_satellite_url, name="Google Maps Satellite", attribution="Google")

# Initialize the bounding box
bbox = None

# Create an empty list to store Earth Engine features
features = []

for i, file in enumerate(os.listdir(path_to_predict_images)):
    kml_file = path_to_results + 'predictions_{}.kml'.format(file)
    # print(kml_file)
    layer_name = os.path.splitext(file)[0]

    # Read the KML file
    kml_root = parse_kml_file(kml_file)

    # Print KML file contents
```


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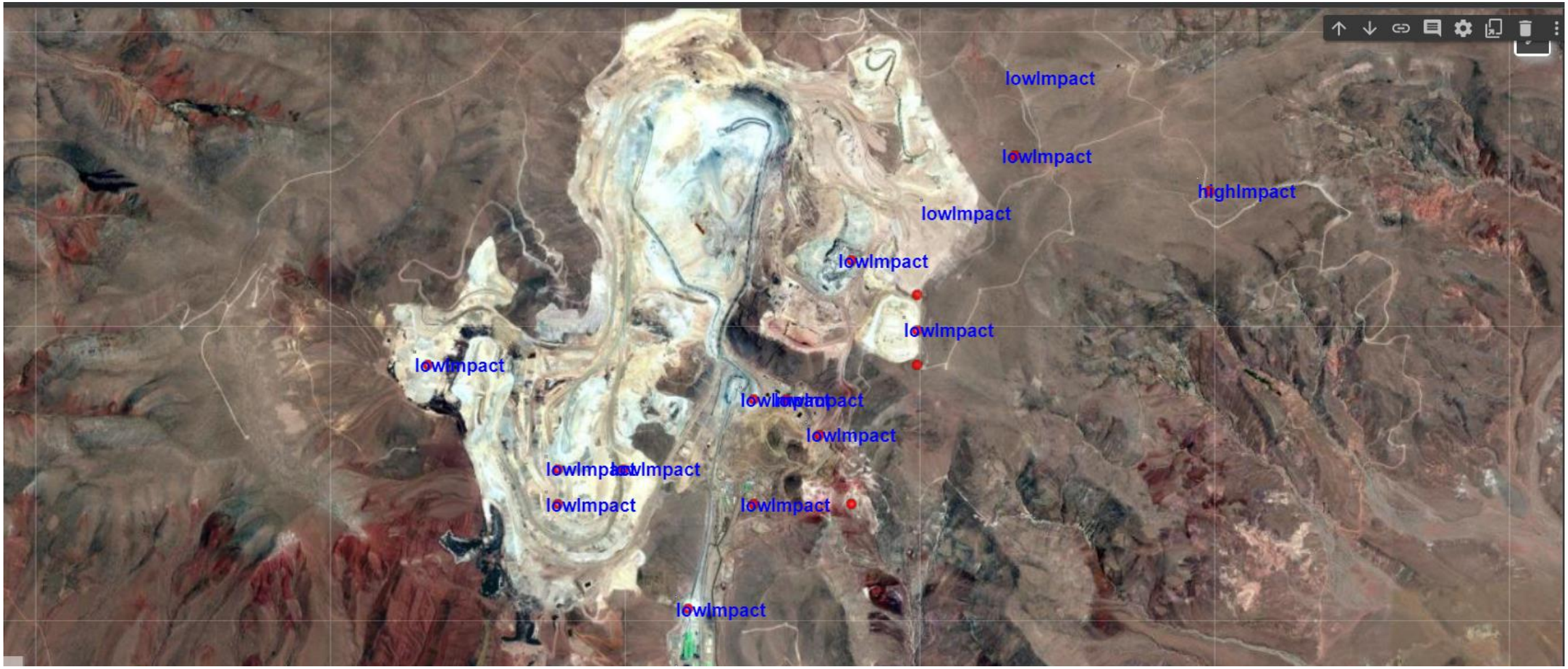
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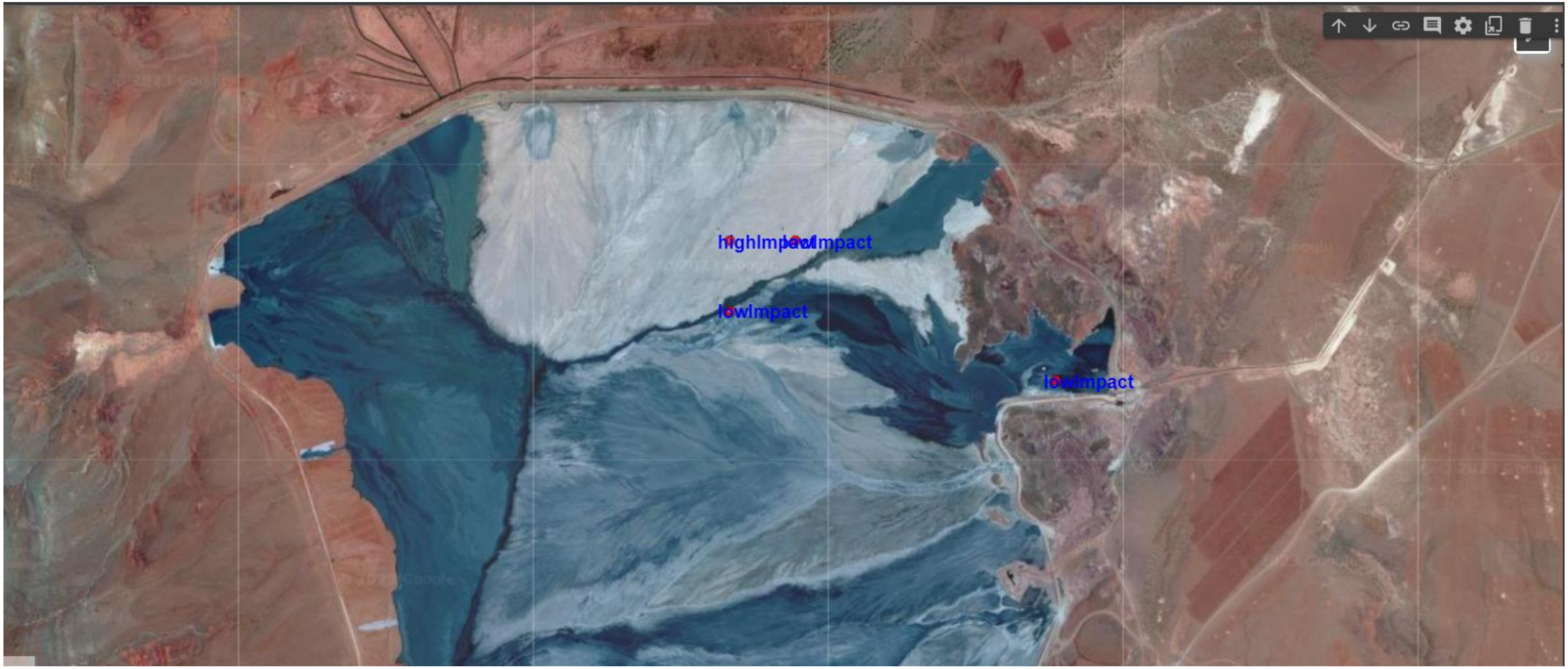

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colab.research.google.com/drive/1jH3SuiOrgImPCIyVFeW69byQrc94IqrX?authuser=1#scrollTo=RXUbtAzqSfQt

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minetailingsdams.ipynb

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RAM Disk

```
    for placemark in kml_root.findall('.//{http://www.opengis.net/kml/2.2}Placemark'):
        point = placemark.find('{http://www.opengis.net/kml/2.2}Point')
        if point is not None:
            name = placemark.find('{http://www.opengis.net/kml/2.2}name').text.strip()
            coordinates = point.find('{http://www.opengis.net/kml/2.2}coordinates').text.strip().split(',')
            coordinates = [float(coordinates[0]), float(coordinates[1])]
            bbox = update_bbox(bbox, coordinates)

            # Create an Earth Engine feature and add it to the list
            ee_geometry = ee.Geometry.Point(coordinates)
            feature = ee.Feature(ee_geometry, {'coordinates': coordinates, 'name': name})
            features.append(feature)

# Create an Earth Engine FeatureCollection from the list of features
feature_collection = ee.FeatureCollection(features)

# Extract features from Earth Engine to a list
features_list = feature_collection.getInfo()['features']

# Create a DataFrame from the list
df = pd.DataFrame([feat['properties'] for feat in features_list])

# Convert the coordinates to separate latitude and longitude columns
df[['longitude', 'latitude']] = pd.DataFrame(df['coordinates'].to_list(), index=df.index)

# Convert the DataFrame to a GeoDataFrame
gdf = gpd.GeoDataFrame(df, geometry=gpd.points_from_xy(df.longitude, df.latitude))

# Add the FeatureCollection as a single layer on the map
Map.addLayer(feature_collection, {'color': 'FF0000'}, 'All Markers')

# Add labels to the map
Map.add_labels(gdf, 'name', font_size="12pt", font_color="blue", font_family="arial", font_weight="bold")

# Calculate the center of the bounding box
center = [(bbox[0] + bbox[2]) / 2, (bbox[1] + bbox[3]) / 2]

# Set the map center and zoom level
Map.setCenter(center[0], center[1], 10)
```


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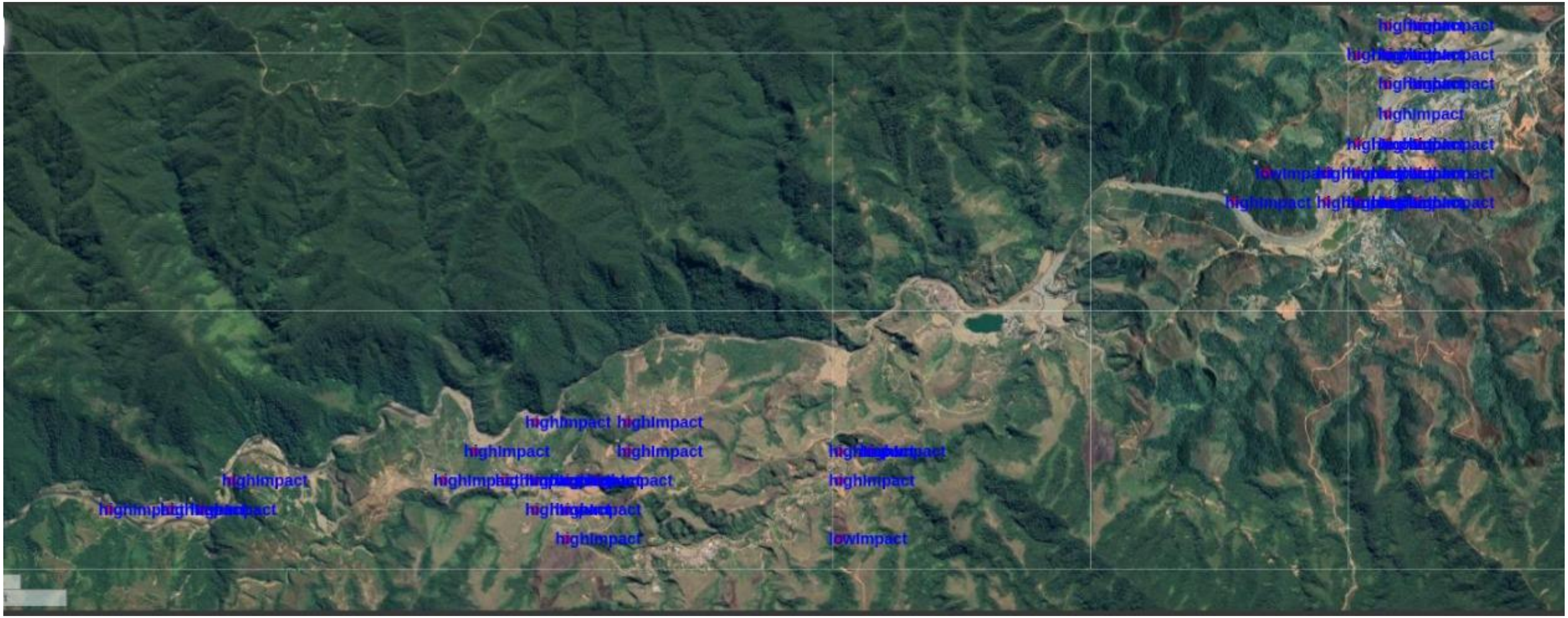
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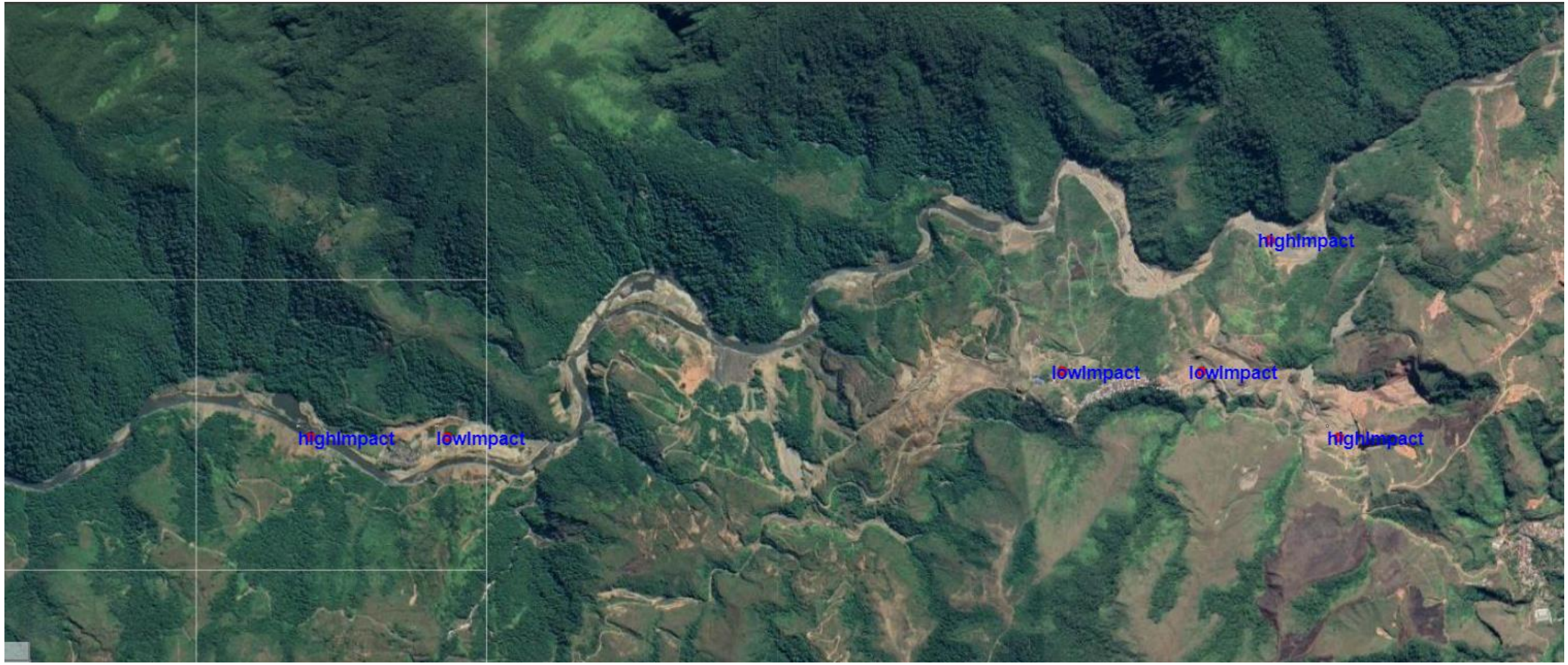
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Muchas gracias

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- Ing. Adrián Villarroel
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