

Project GeolCT

2021-2022

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Geoprocessing

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Introduction

Geoprocessing

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Why geoprocessing

- Some data does not (always) give answers
 - Answer given by parts of features
 - Answer given by complex relations with other features
- Data processing and data analysis required to convert data to information
- Allows to answer (complex) spatial questions























Difference with spatial queries

- Geoprocessing frequently preceded to allow asking questions
- Queries limited to attributes and entire features, rather than looking inside parts of the feature or complex relations between features
- Queries results in subsets of input dataset

Some background

What kind of data?

- Geoprocessing-algorithms are frequently suitable for either vector data, or raster data (not both)
- Here: primary focus on vector data

- ▶  Cartography
- ▶  Database
- ▶  File tools
- ▶  Graphics
- ▶  Interpolation
- ▶  Layer tools
- ▶  Network analysis
- ▶  Raster analysis
- ▶  Raster terrain analysis
- ▶  Raster tools
- ▶  Vector analysis
- ▶  Vector creation
- ▶  Vector general
- ▶  Vector geometry
- ▶  Vector overlay
- ▶  Vector selection
- ▶  Vector table
- ▶  GDAL
- ▶  GRASS
- ▶  LAStools
- ▶  Qgis2threejs
- ▶  SAGA

Some background

Help and support

- QGIS: limited explanation of various tools
- QGIS website and forums: are full of information
- Conceptual descriptions...

QGIS 2.8 DOCUMENTATION QGIS 2.8 Search English

» A Gentle Introduction to GIS » previous | next

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 - Spatial Analysis (Interpolation)

Vector Spatial Analysis (Buffers)

Objectives: Understanding the use of buffering in vector spatial analysis.

Keywords: Vector, buffer zone, spatial analysis, buffer distance, dissolve boundary, outward and inward buffer, multiple buffer

Overview

Spatial analysis uses spatial information to extract new and additional meaning from GIS data. Usually spatial analysis is carried out using a GIS Application. GIS Applications normally have spatial analysis tools for feature statistics (e.g. how many vertices make up this polyline?) or geoprocessing such as feature buffering. The types of spatial analysis that are used vary according to subject areas. People working in water management and research (hydrology) will most likely be interested in analysing terrain and modelling water as it moves across it. In wildlife

Buffer

Parameters Log

Input layer

☐ Selected features only

Distance: 10.000000 <unknown>

Segments: 5

End cap style: Round

Join style: Round

Miter limit: 2.000000

☐ Dissolve result

Buffered: [Create temporary layer]

☒ Open output file after running algorithm

0%

Run as Batch Process... Run Close Help

Buffer

This algorithm computes a buffer area for all the features in an input layer, using a fixed or dynamic distance.

The segments parameter controls the number of line segments to use to approximate a quarter circle when creating rounded offsets.

The end cap style parameter controls how line endings are handled in the buffer.

The join style parameter specifies whether round, miter or beveled joins should be used when offsetting corners in a line.

The miter limit parameter is only applicable for miter join styles, and controls the maximum distance from the offset curve to use when creating a mitered join.

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Important geoprocessing tools in QGIS

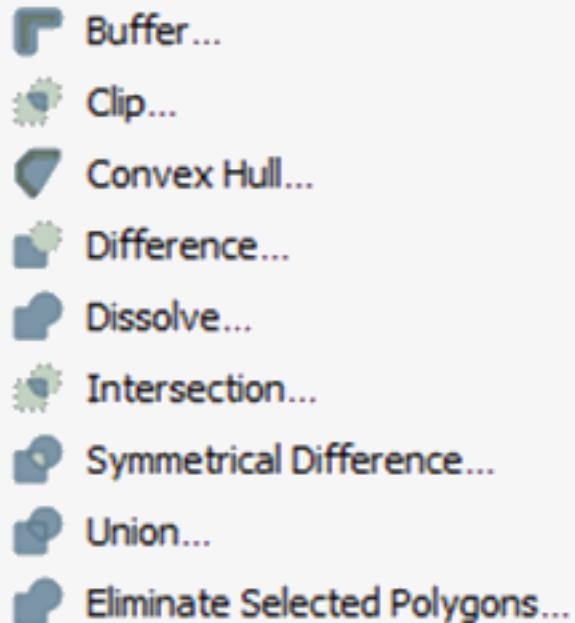
Geoprocessing

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Geoprocessing tools in QGIS

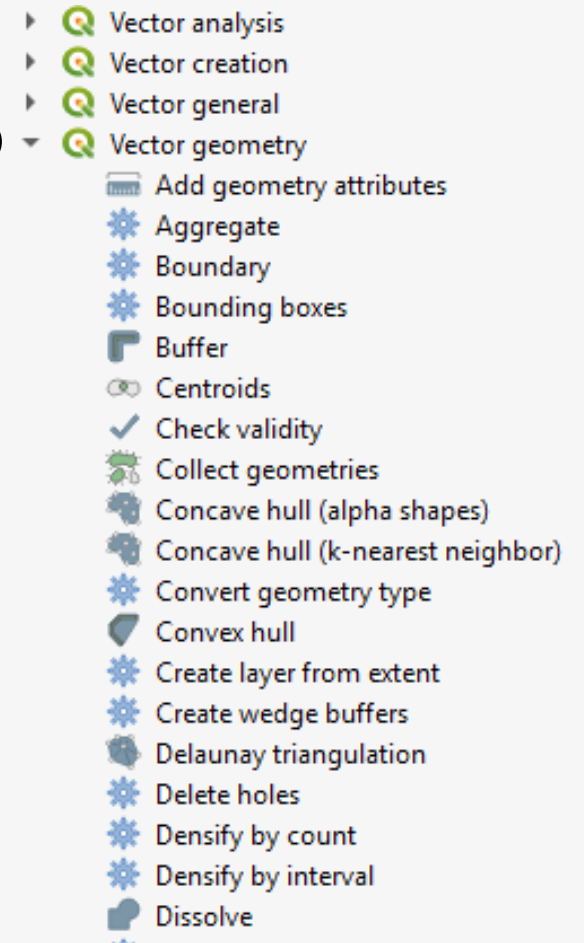
Vector →

Geoprocessing tools:

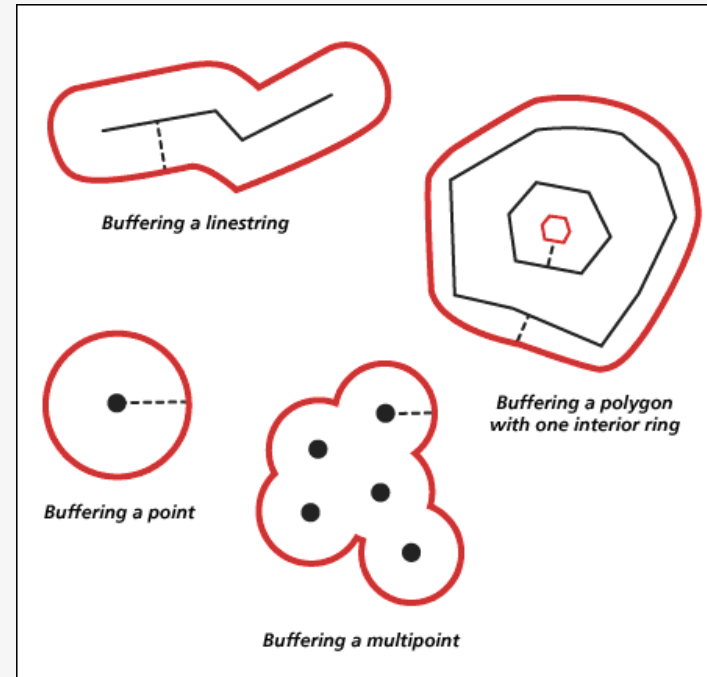
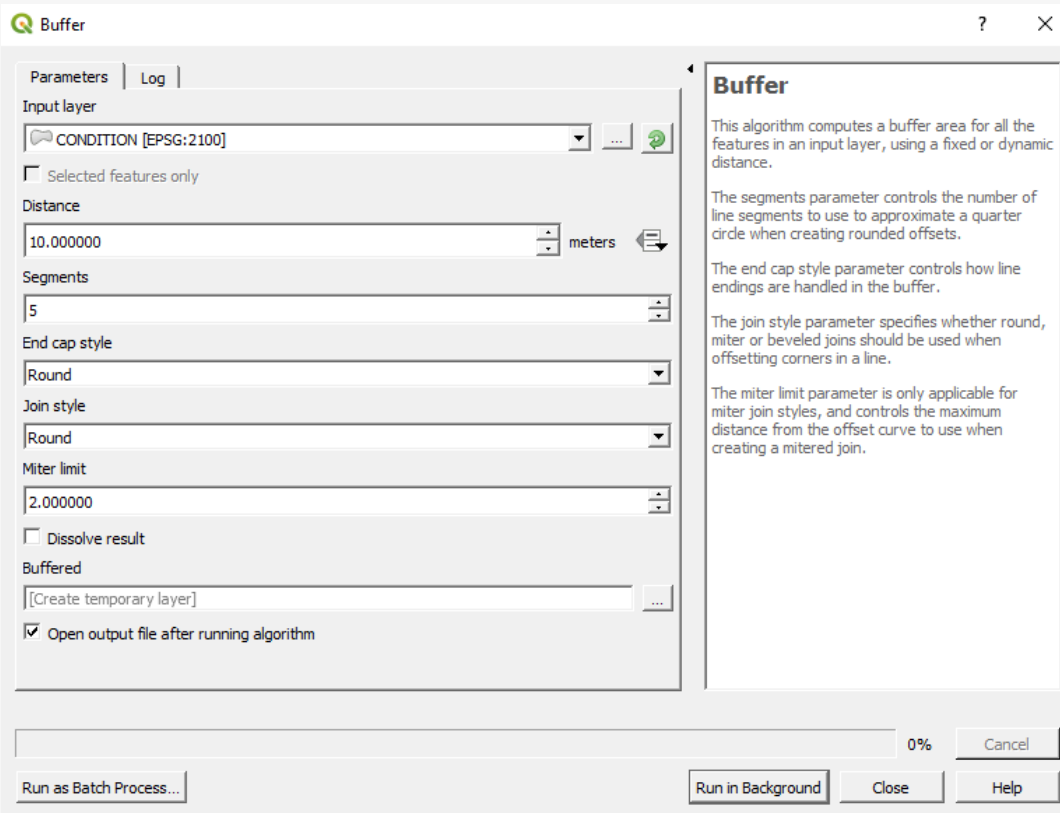


Toolbox →

Vector ...:

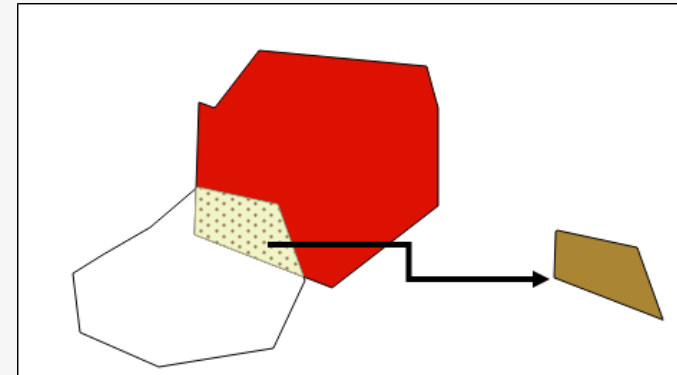
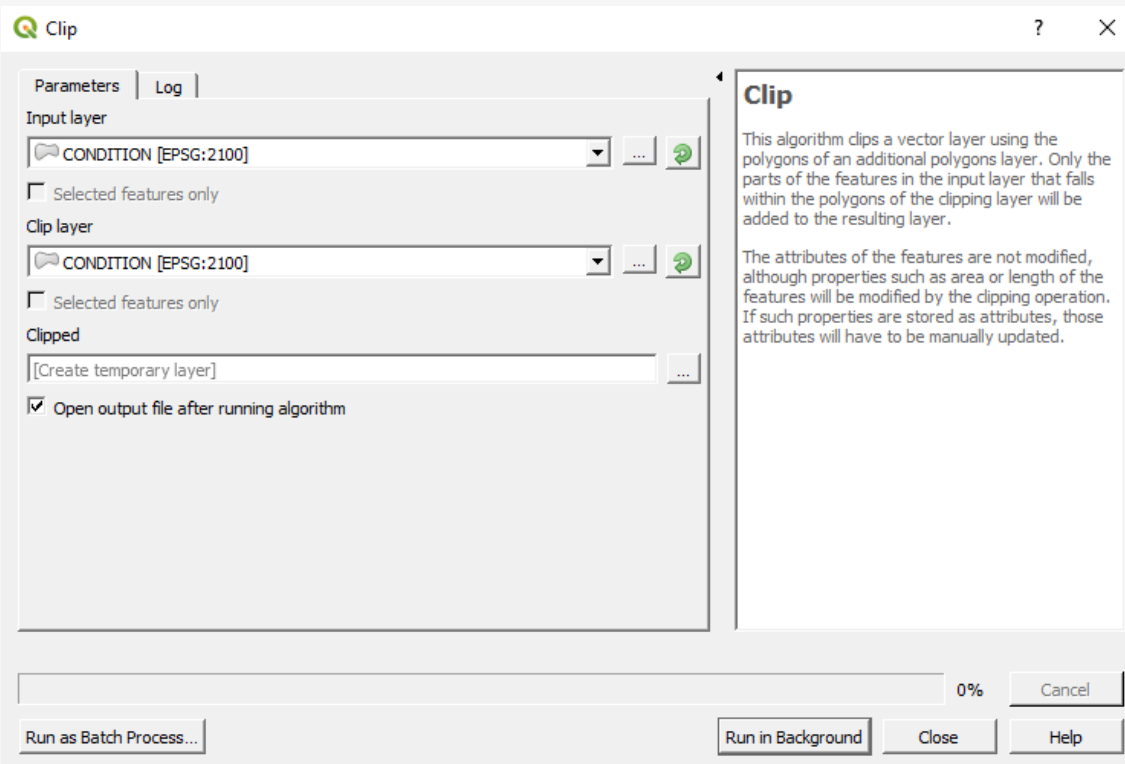


Fixed or variable buffer distance

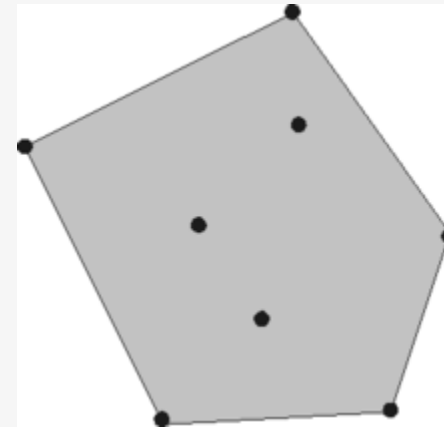
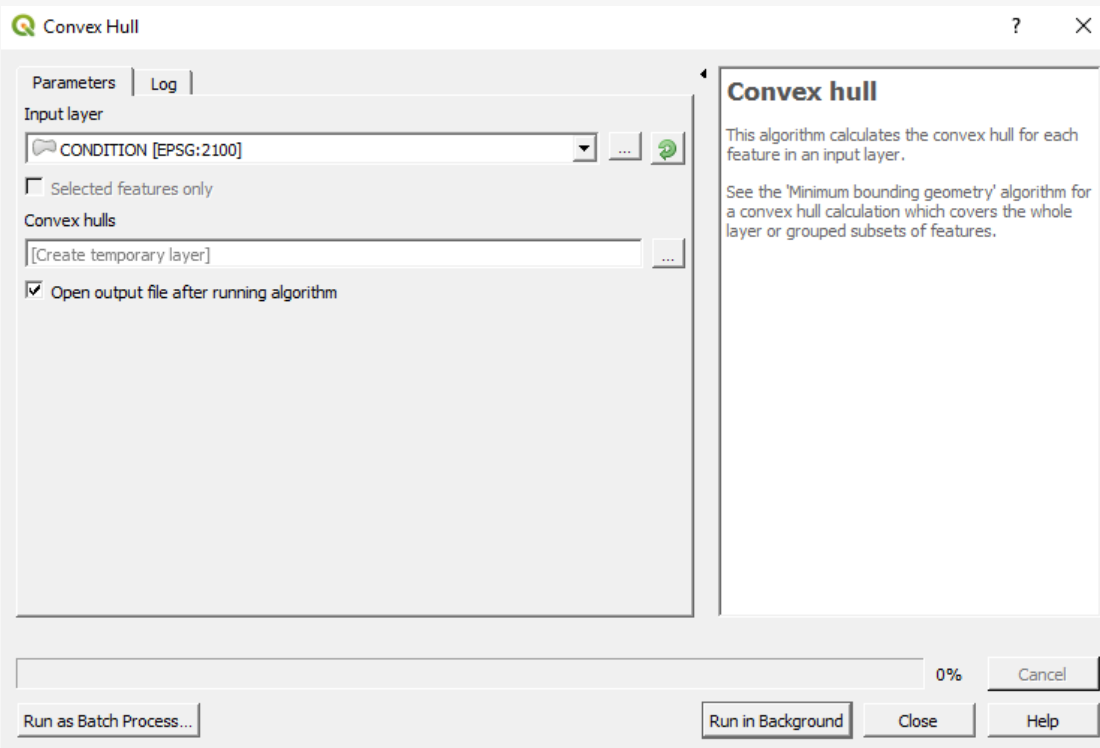


Important geoprocessing tools in QGIS

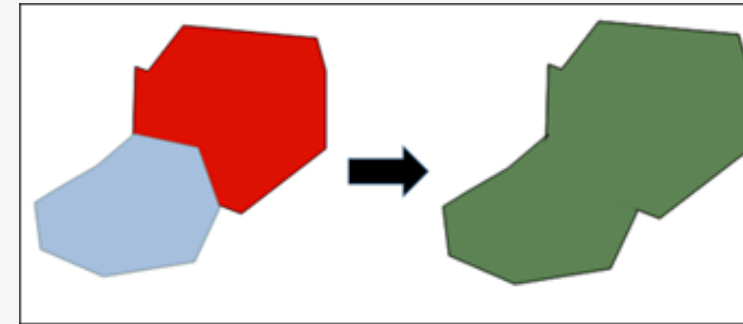
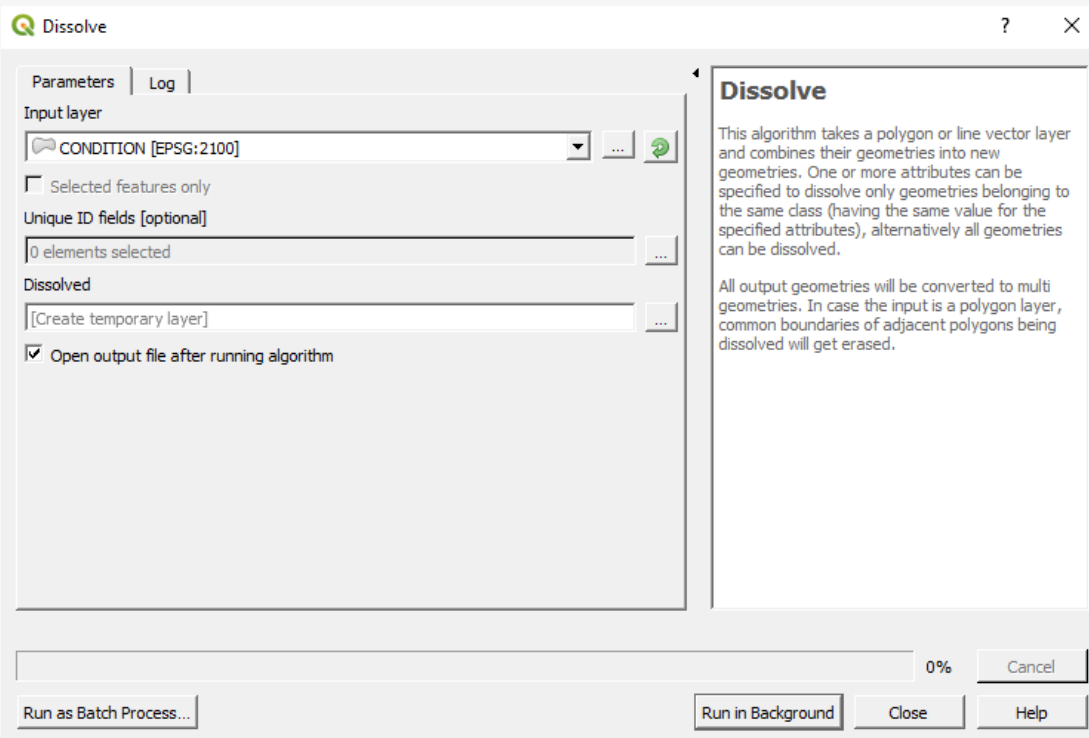
Clip



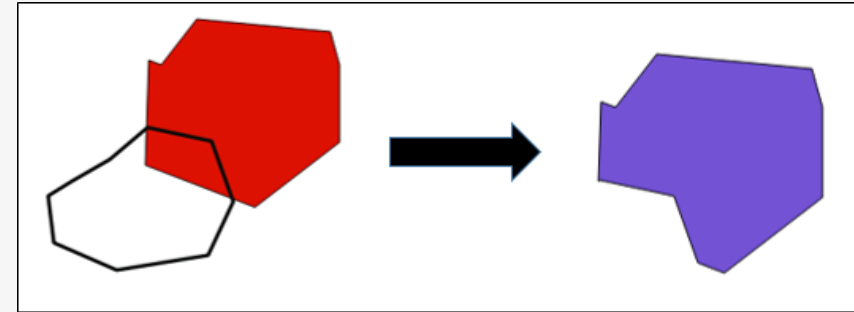
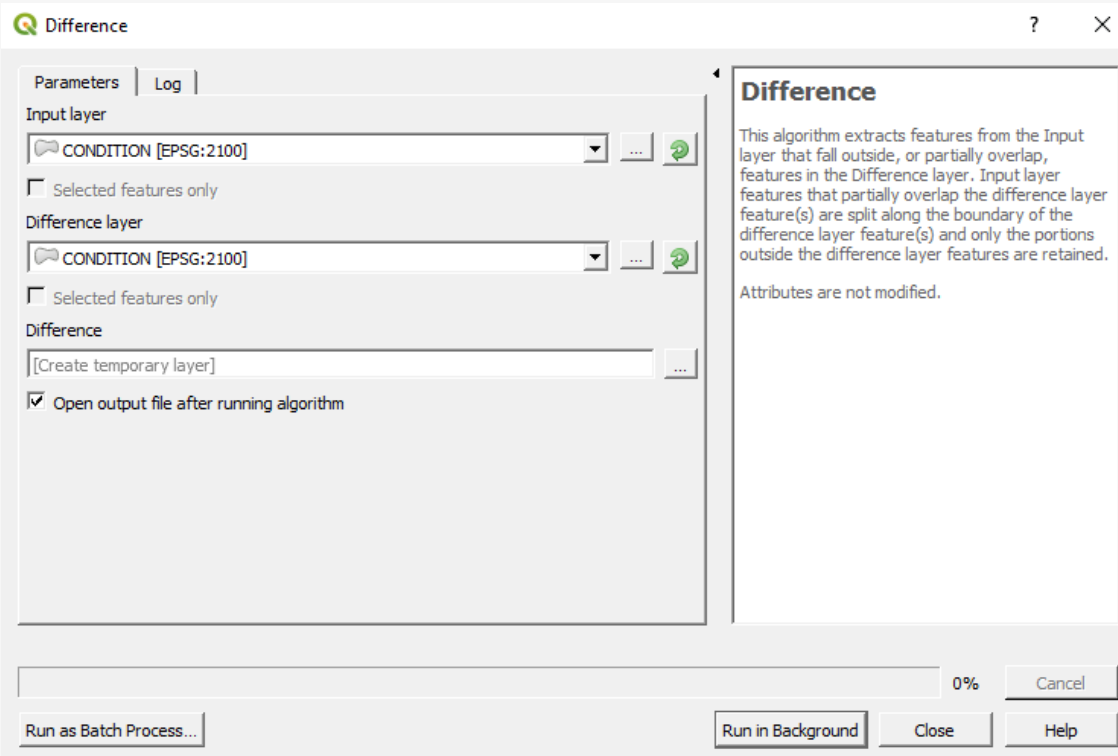
Convex hull



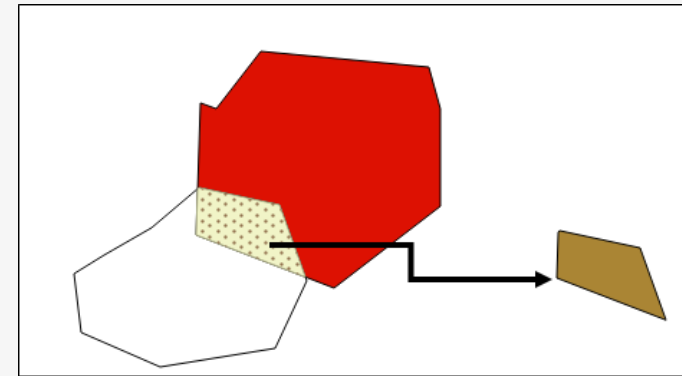
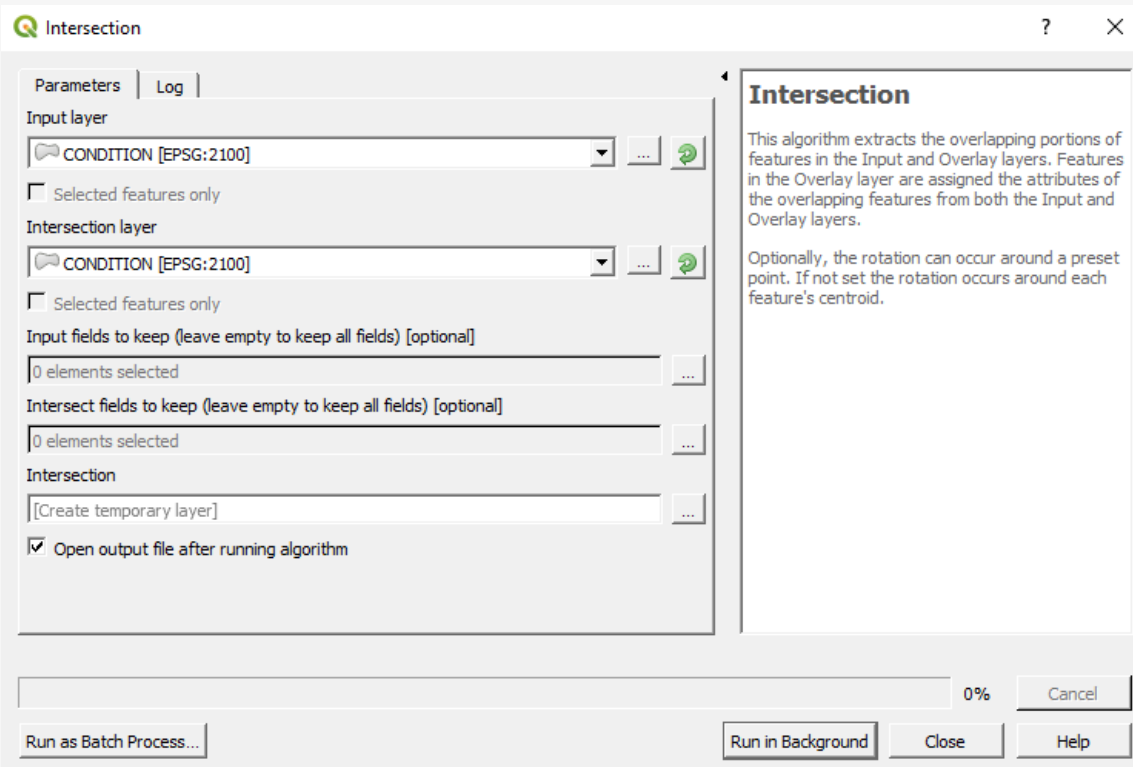
Dissolve: all or based on unique id



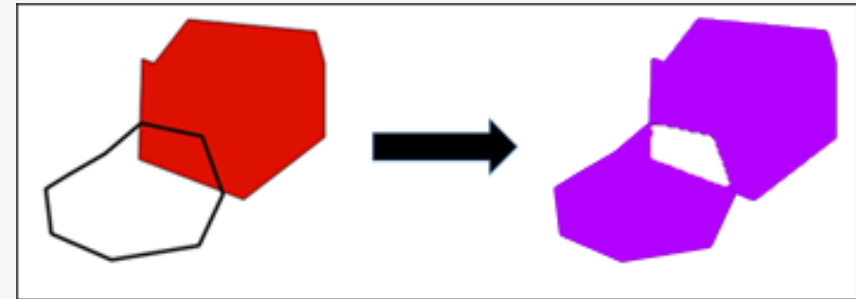
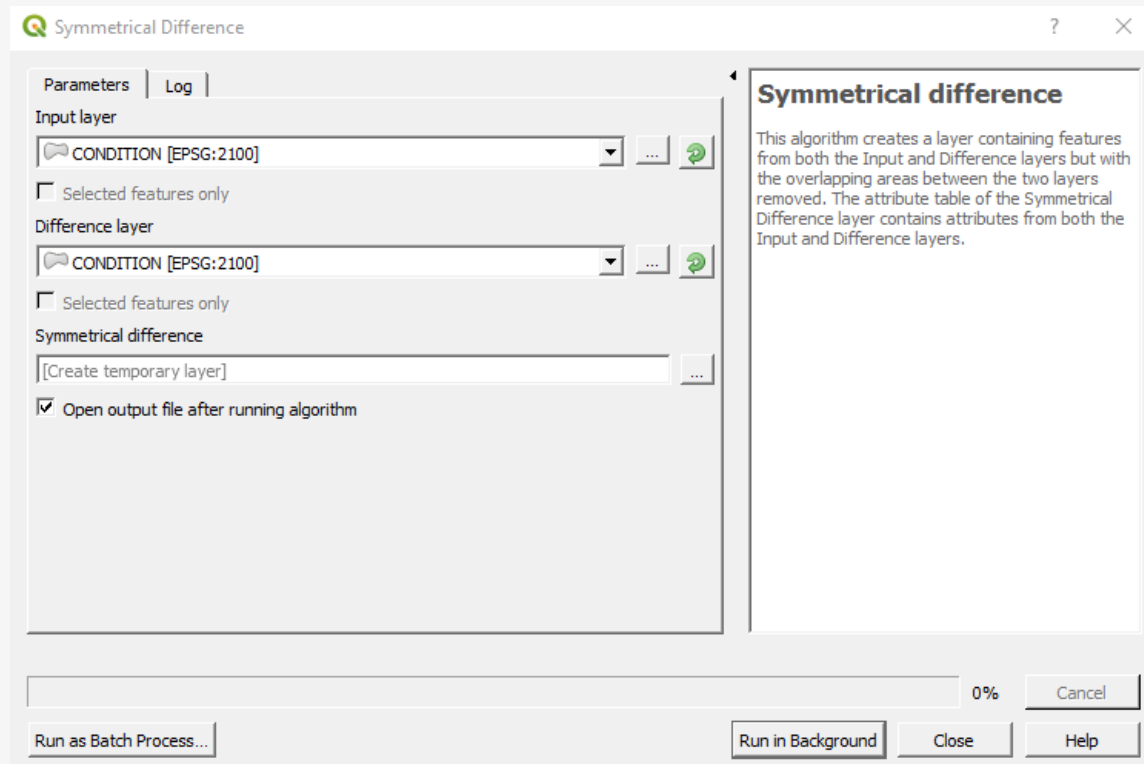
Difference



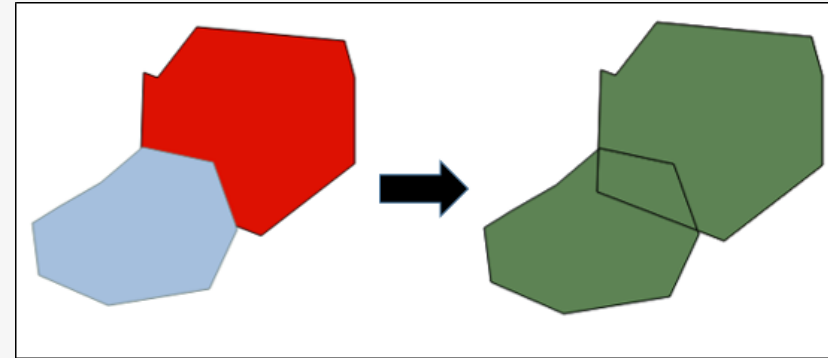
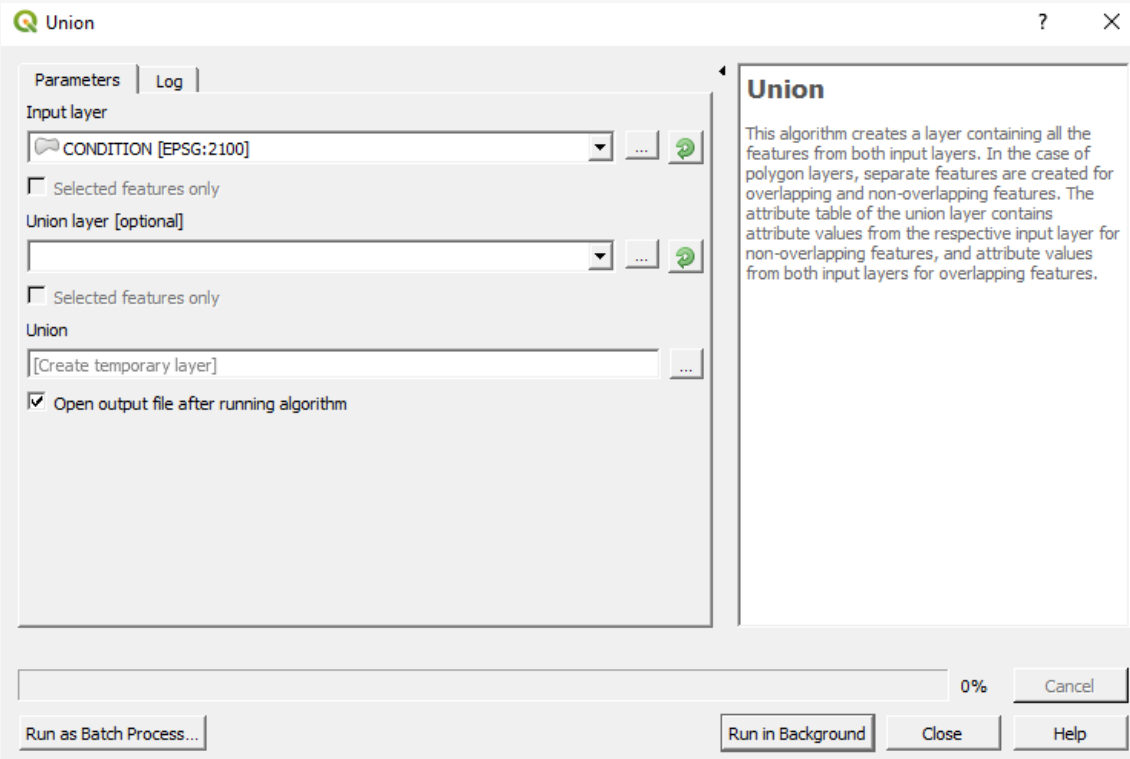
Intersection



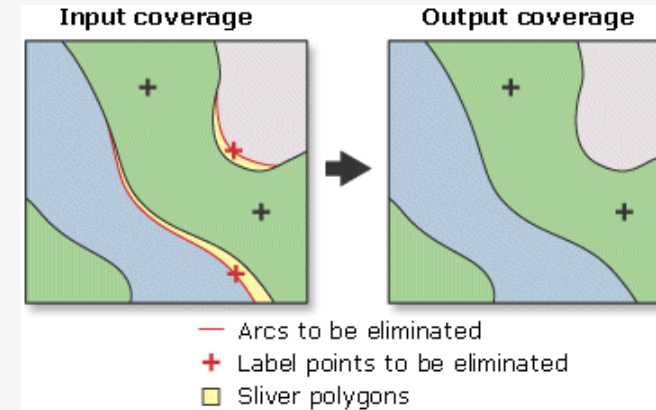
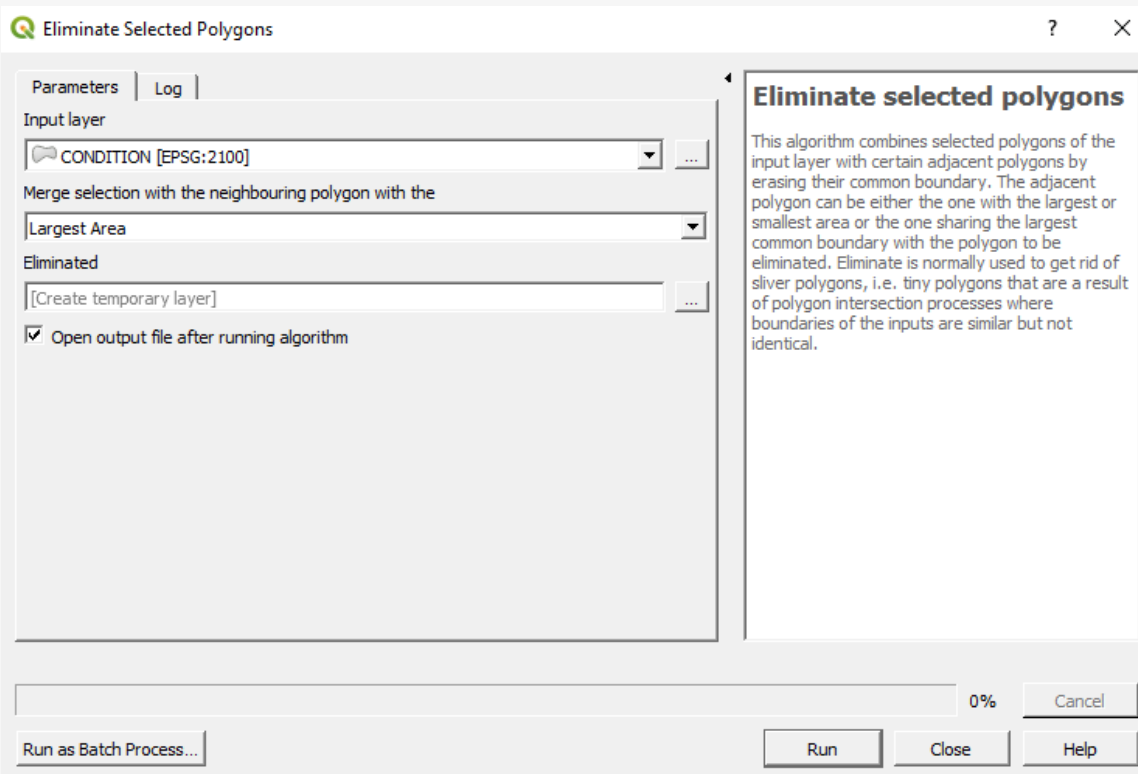
Symmetrical Difference



Union

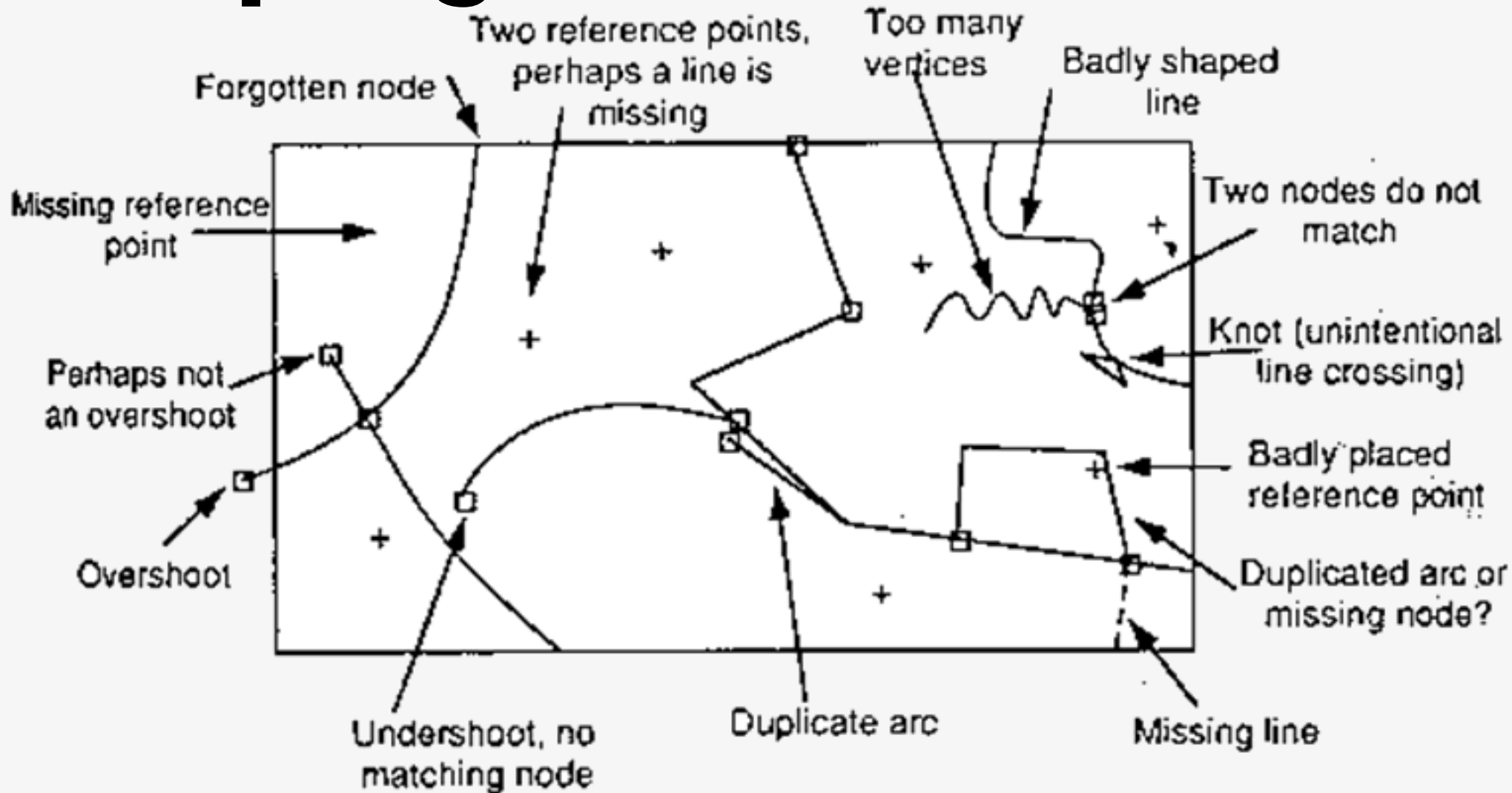


Eliminate Selected Polygons



(=sliver removal)

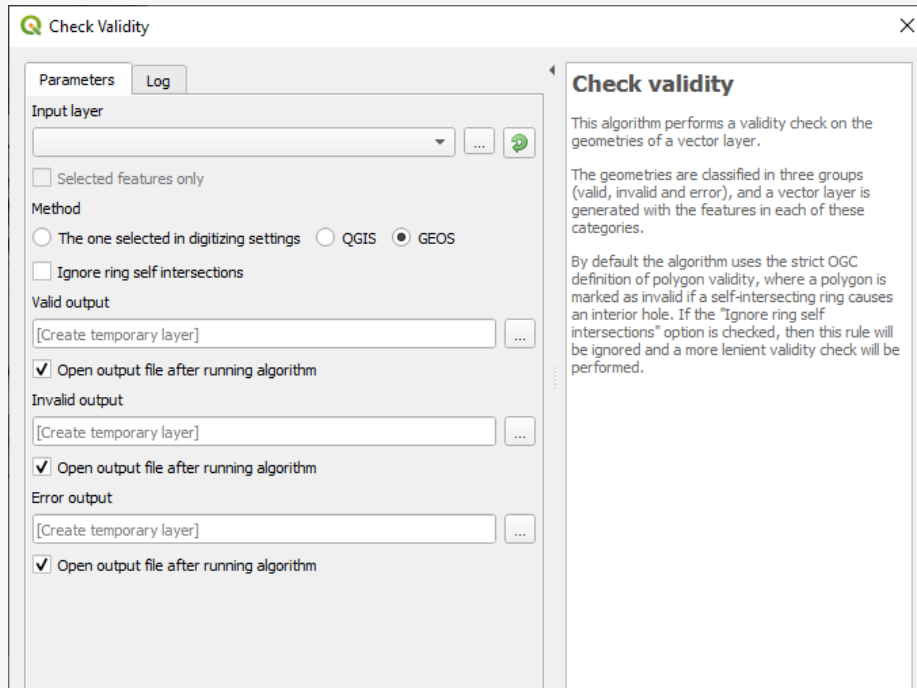
Topological errors



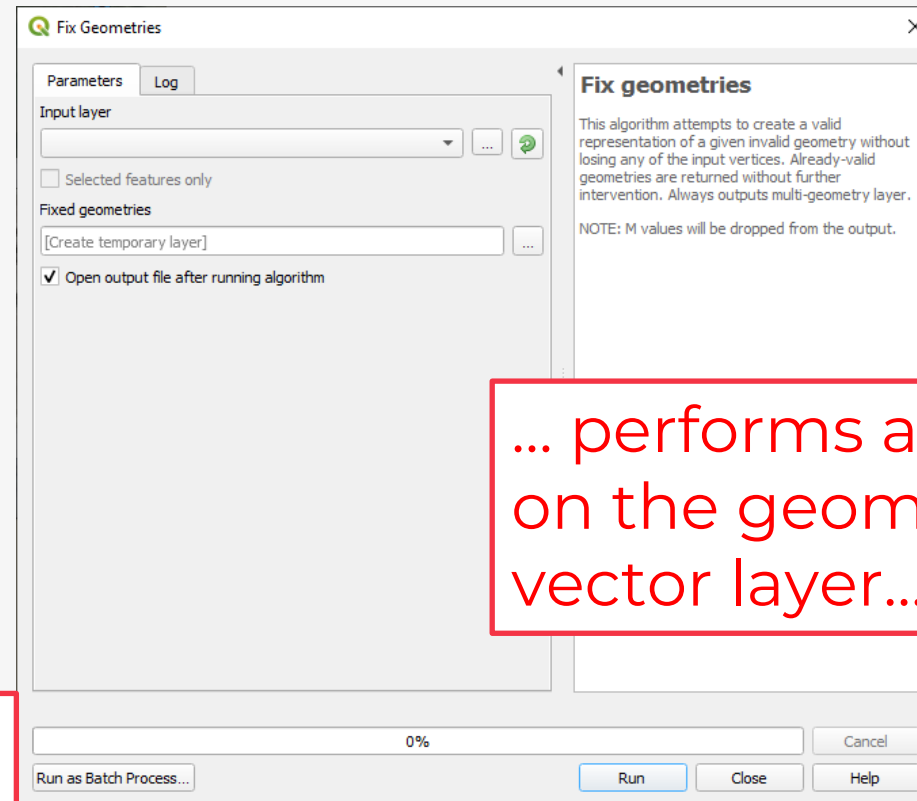
Important geoprocessing tools in QGIS

Topological errors

Sometimes required when spatial data has topological errors (apparent after error message...)

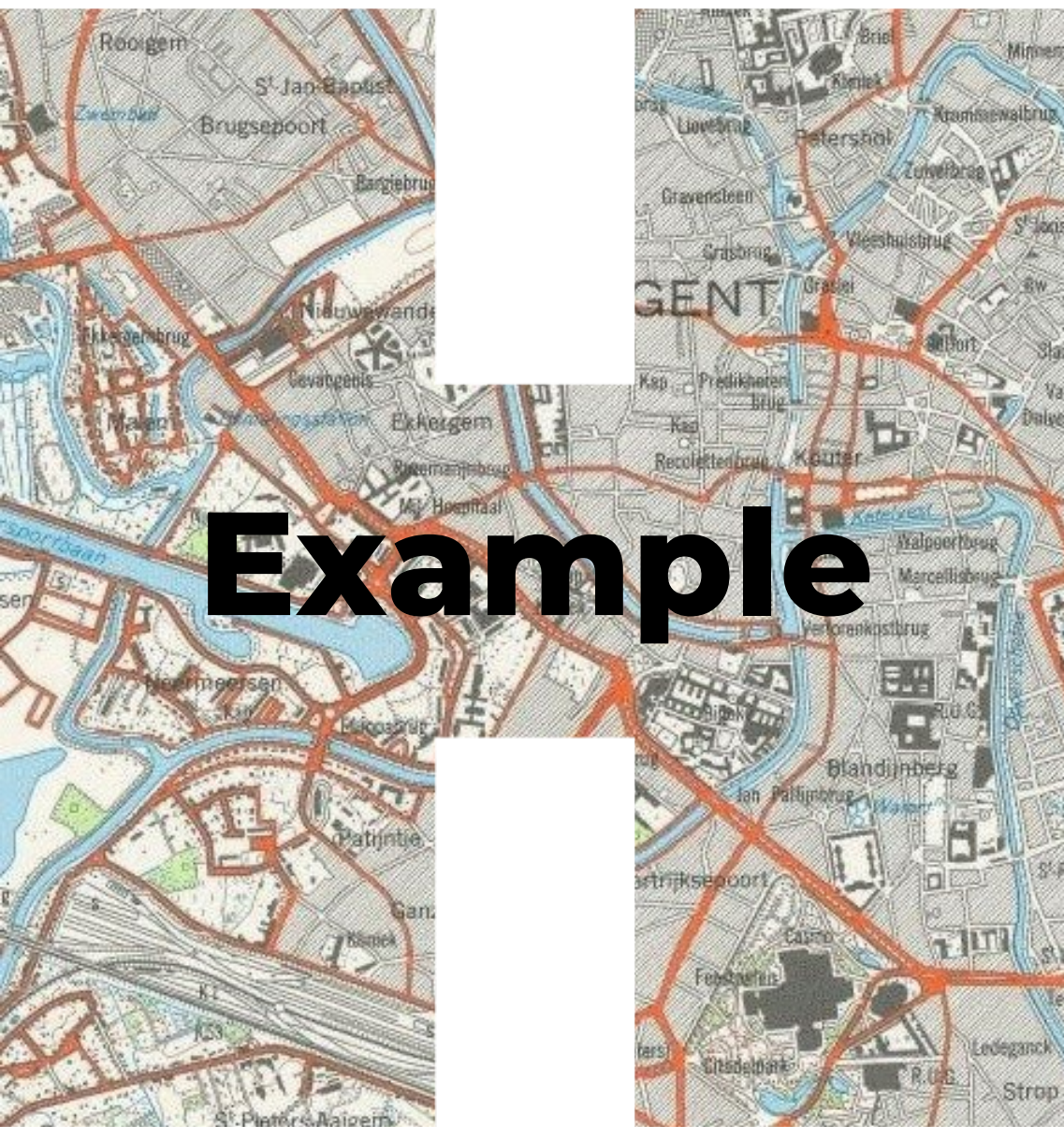


... attempts to create a valid representation of a given invalid geometry without losing any of the input vertices...



... performs a validity check on the geometries of a vector layer...

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Example

Context

Objective:

Make extraction from 'AncientPlaceNames_Pleiades' within Iran that are at least 1 km near a major river or at least 5 km from the sea

Data:

- Sites: AncientPlaceNames_Pleiades
- Countries: ne_10m_admin_0_countries
- Rivers: ne_10m_rivers_lake_centerlines

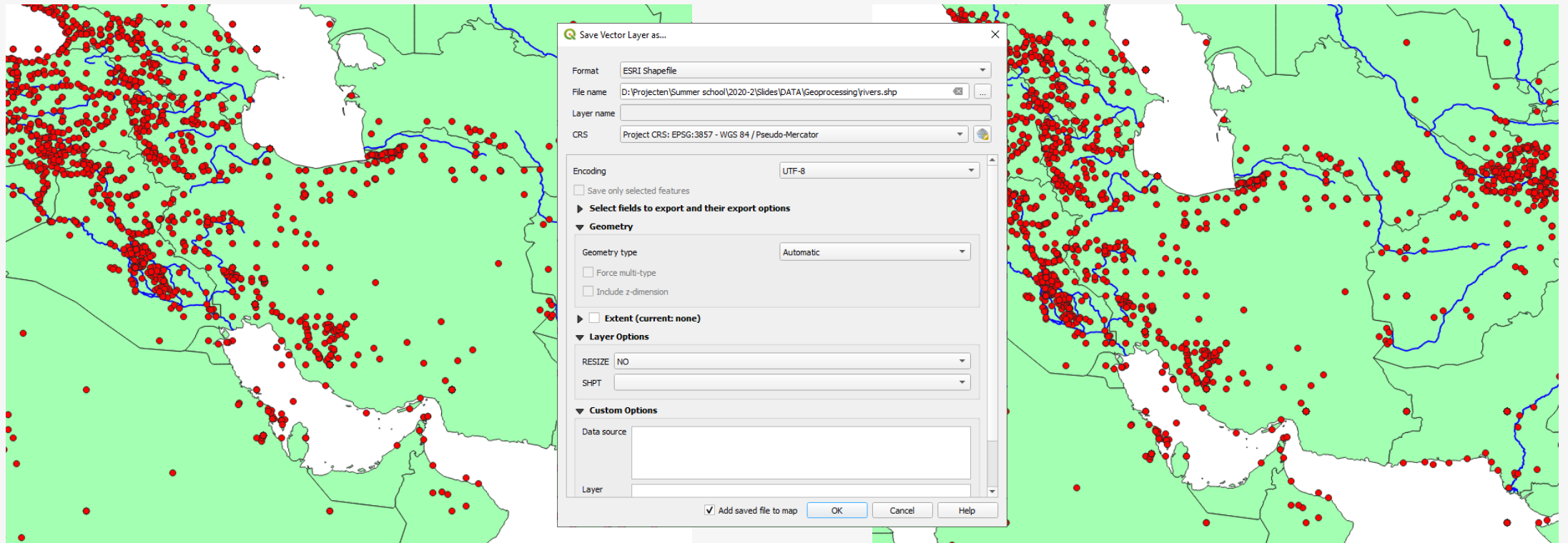
Steps

Make extraction from 'AncientPlaceNames_Pleiades' within Iran that are at least 1 km near a major river or at least 5 km from the sea:

1. Transform data to Pseudo Mercator (EPSG:3587)
2. Select Iran and neighboring countries
3. Dissolve administrative boundaries
4. Buffer (-5km) with administrative boundaries
5. Symmetrical difference between dissolve and buffer
6. Select rivers and buffer (1km)
7. Union river buffers and coastal buffers
8. Clip union with Iran
9. Select sites that intersect with resulting polygon

Example

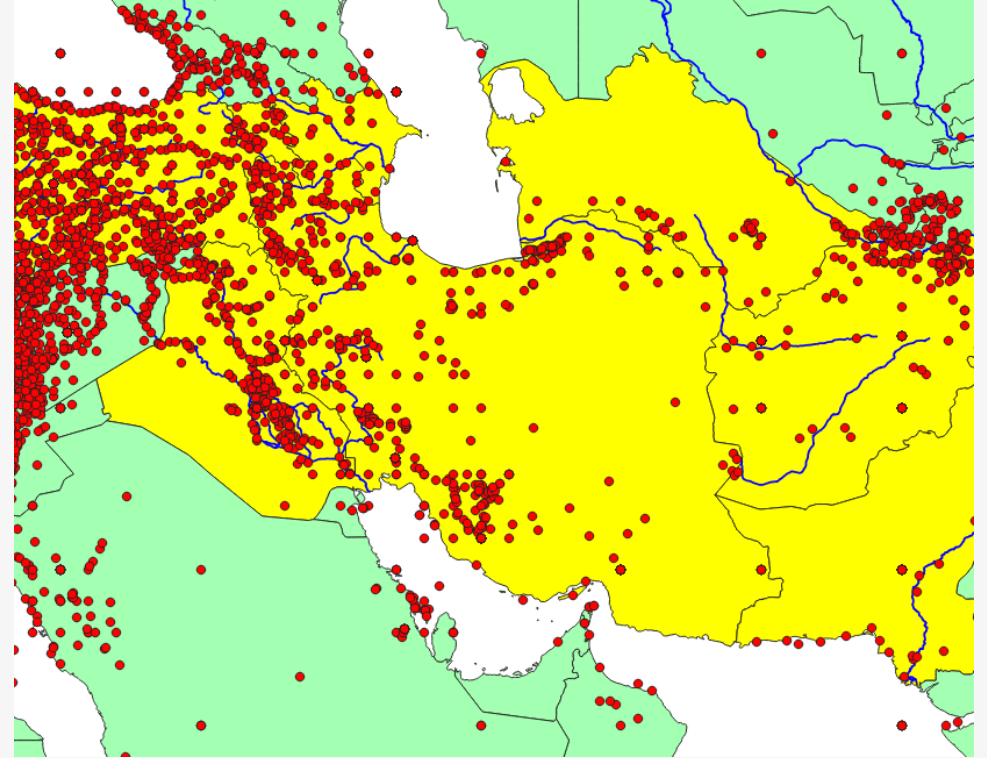
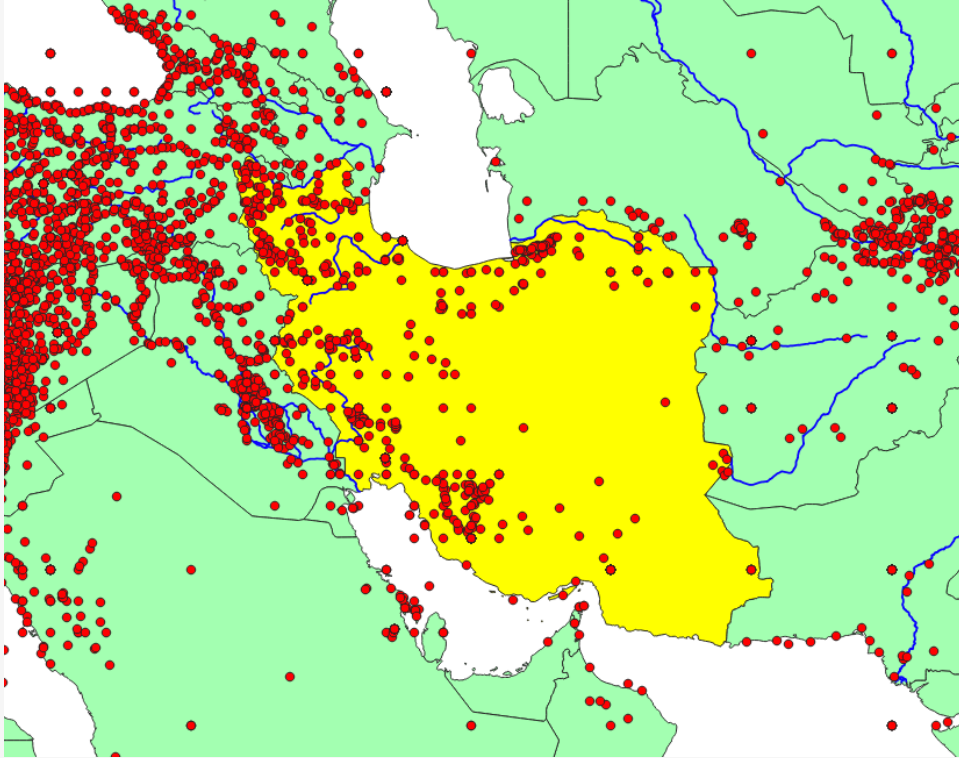
1. Transform data to Pseudo Mercator



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Example

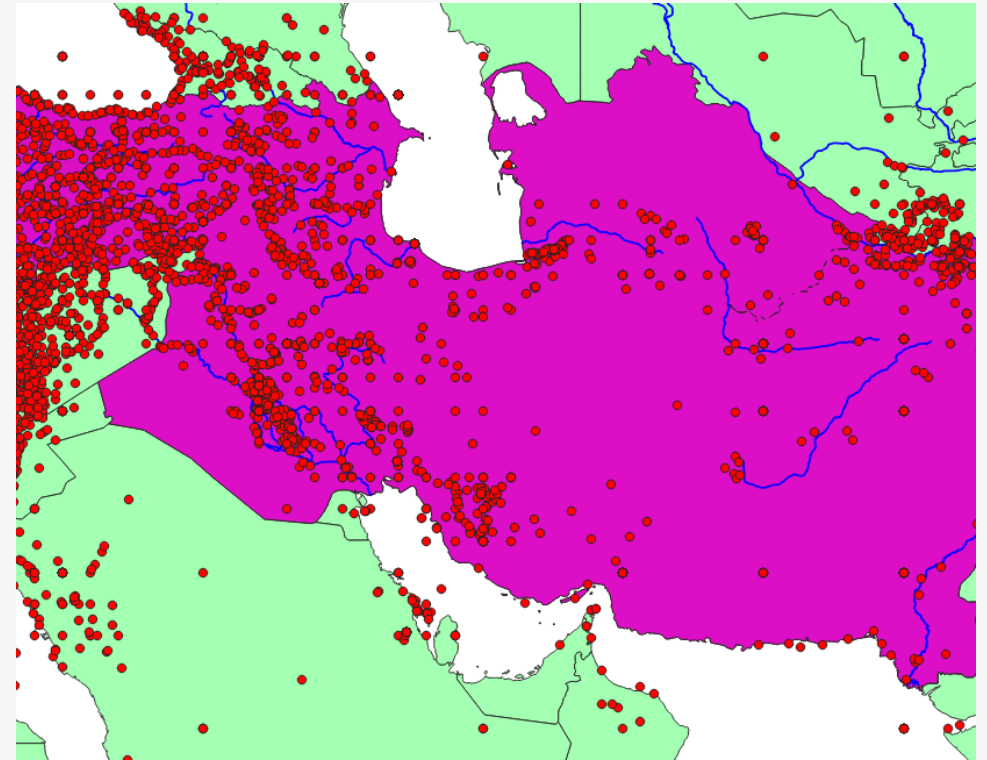
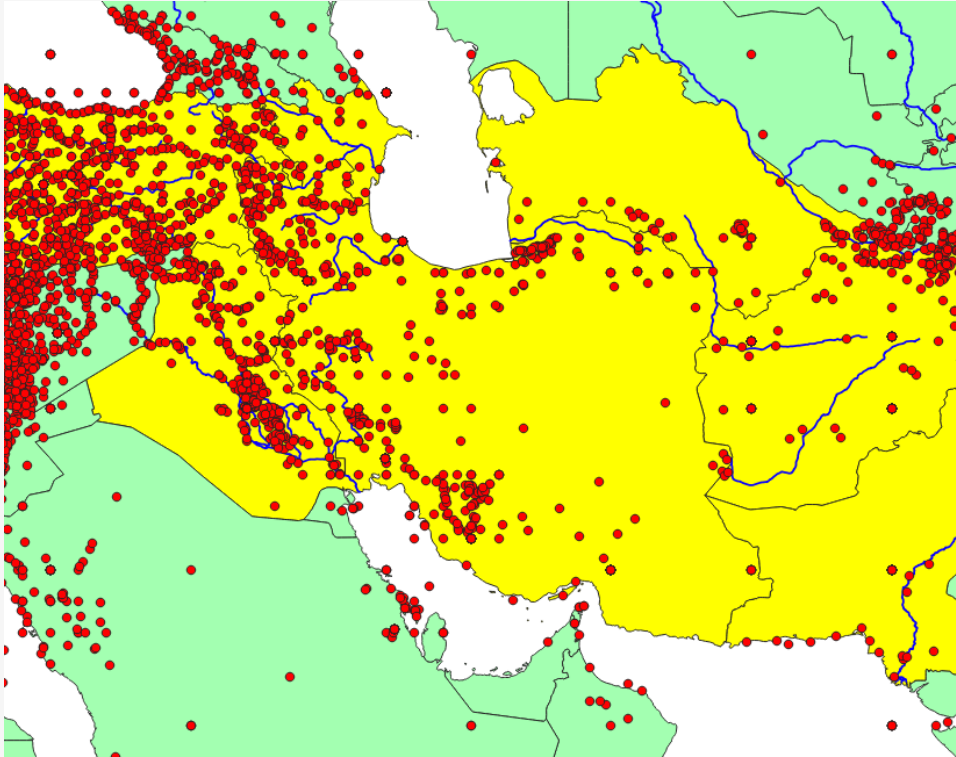
2. Select Iran and neighboring countries



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Example

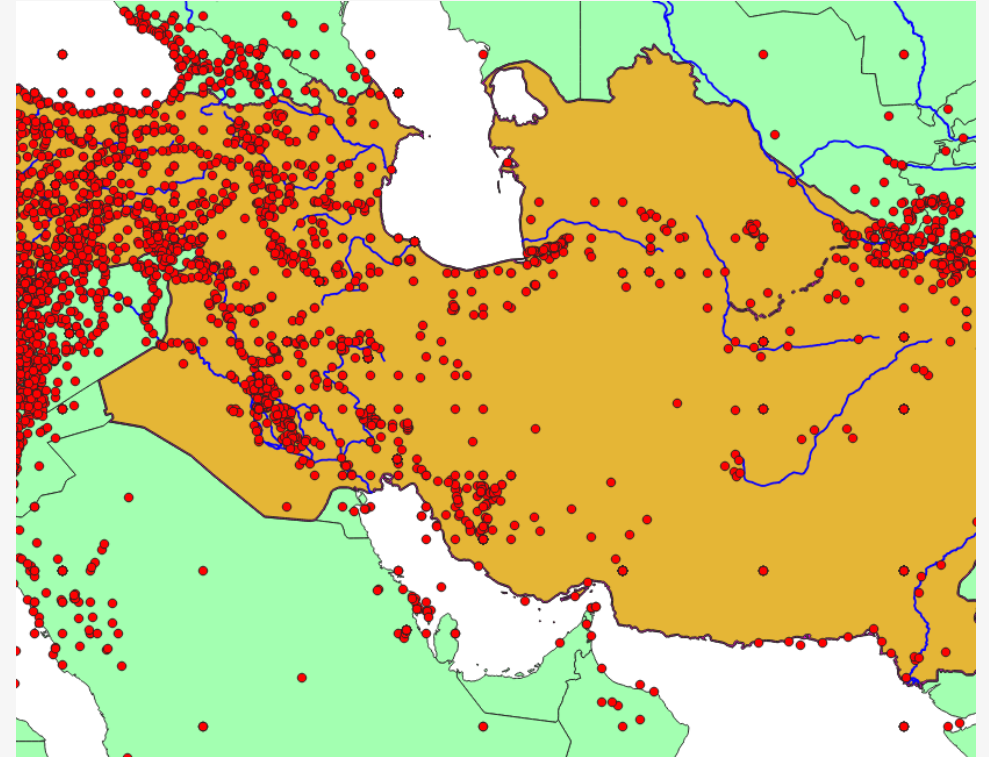
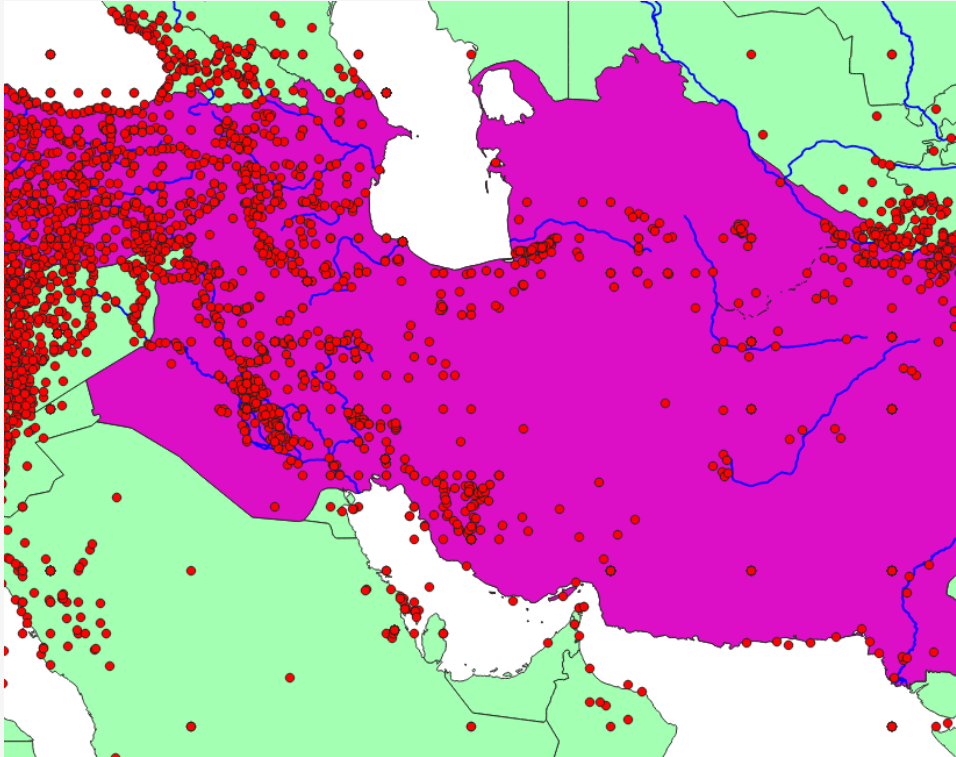
3. Dissolve administrative boundaries



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Example

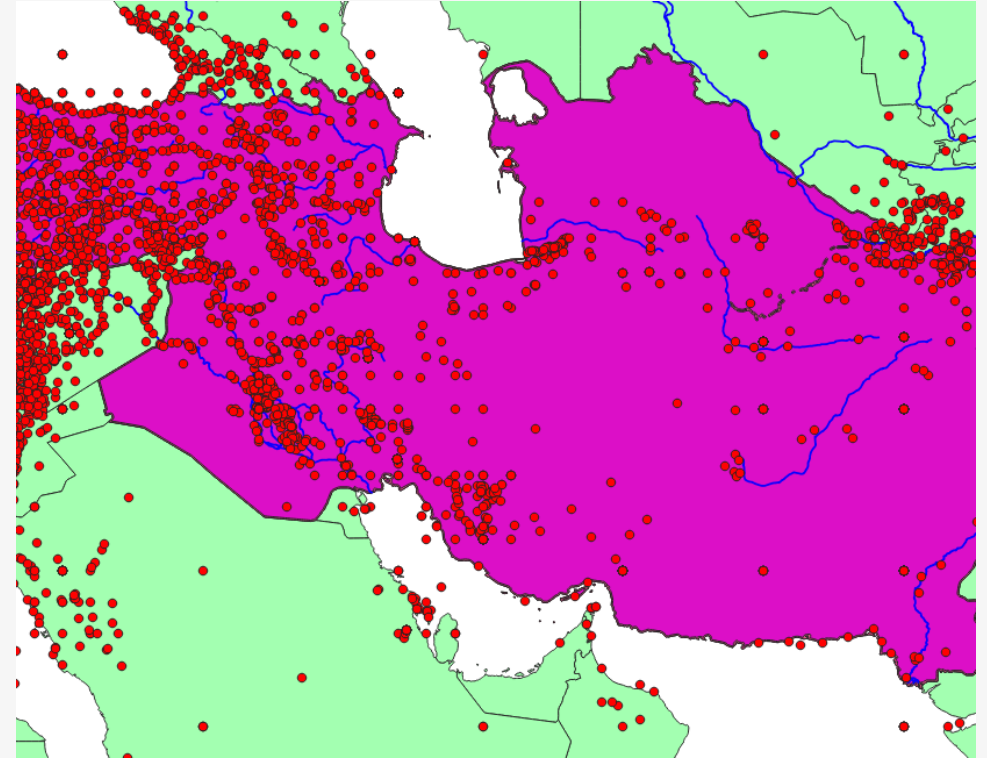
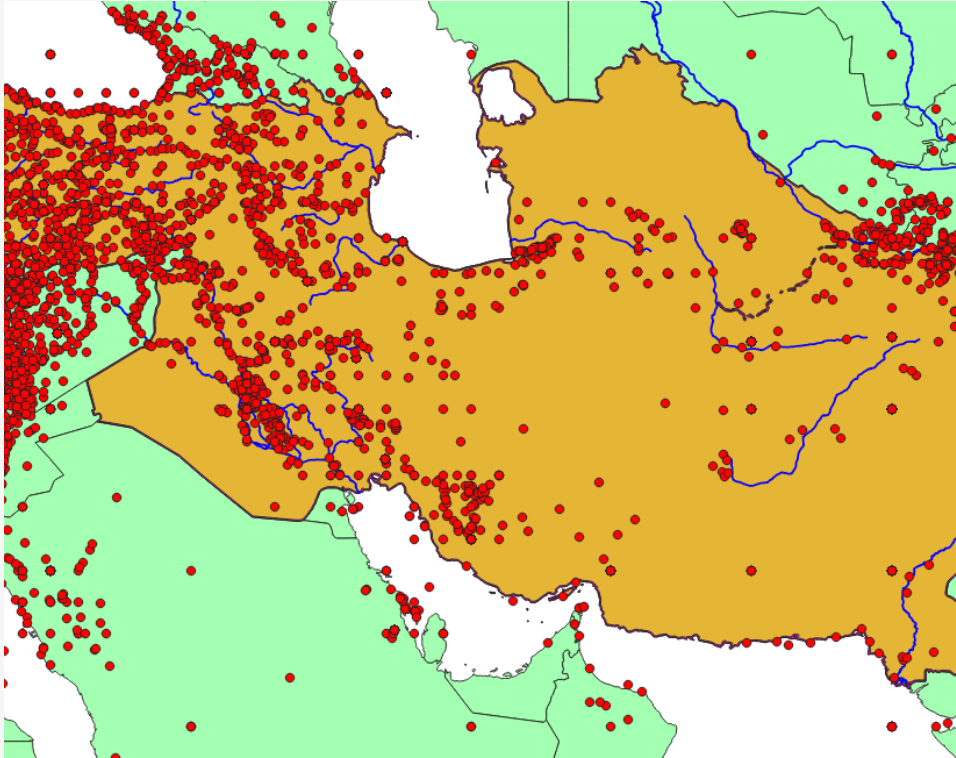
4 Buffer (-5km) with administrative boundaries



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Example

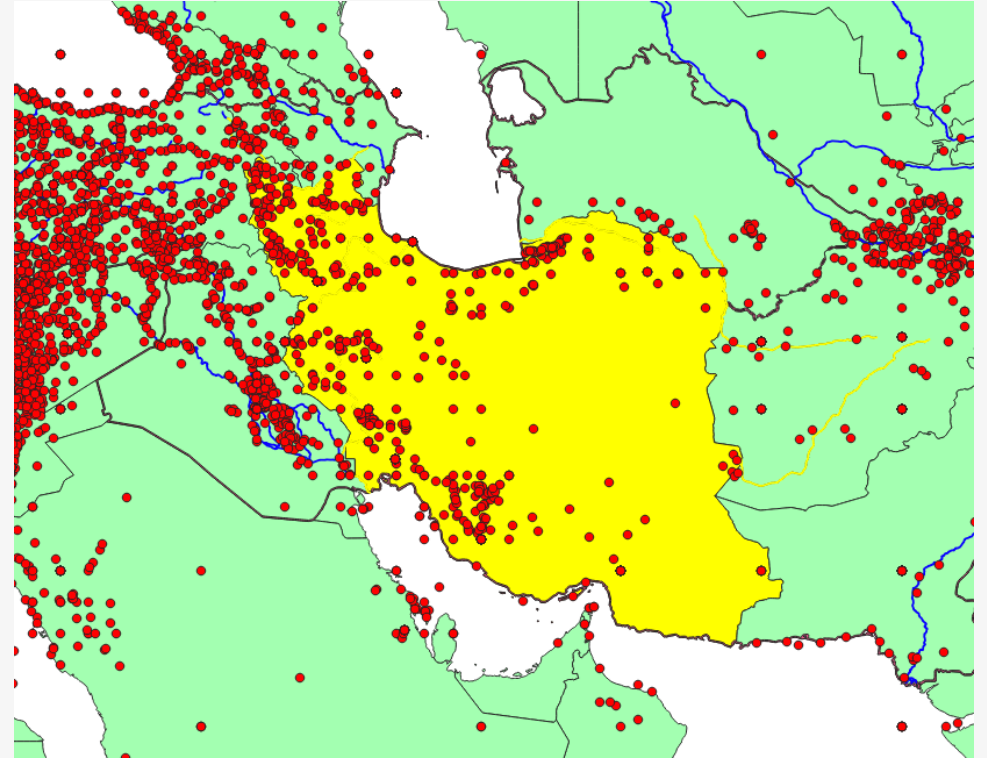
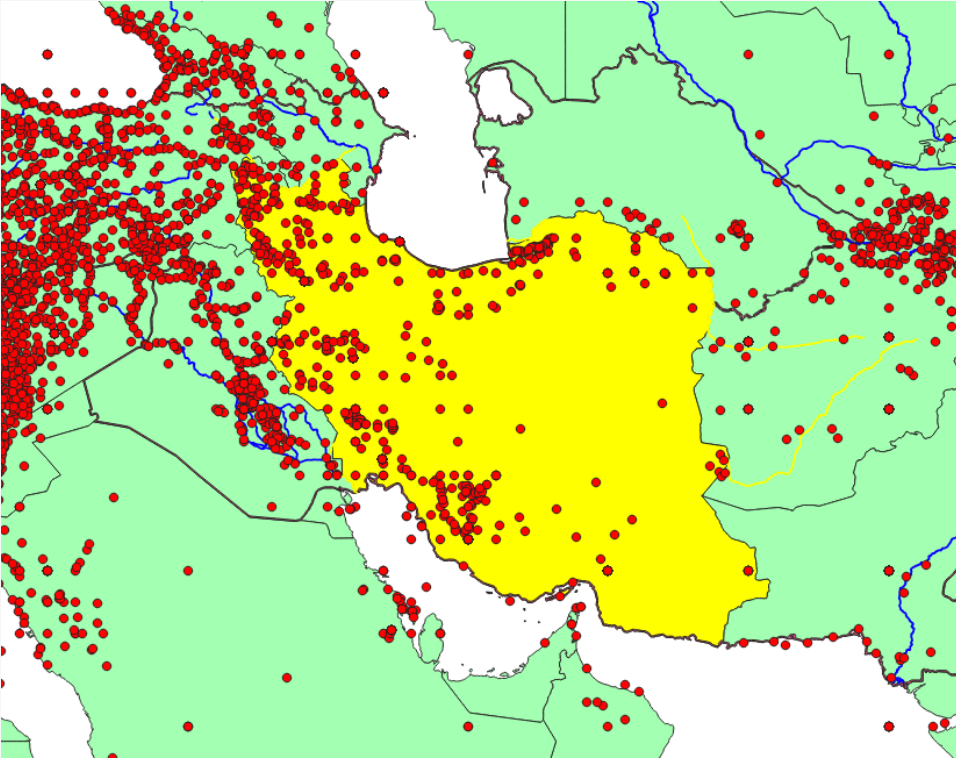
5. Symmetrical difference between dissolve and buffer



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Example

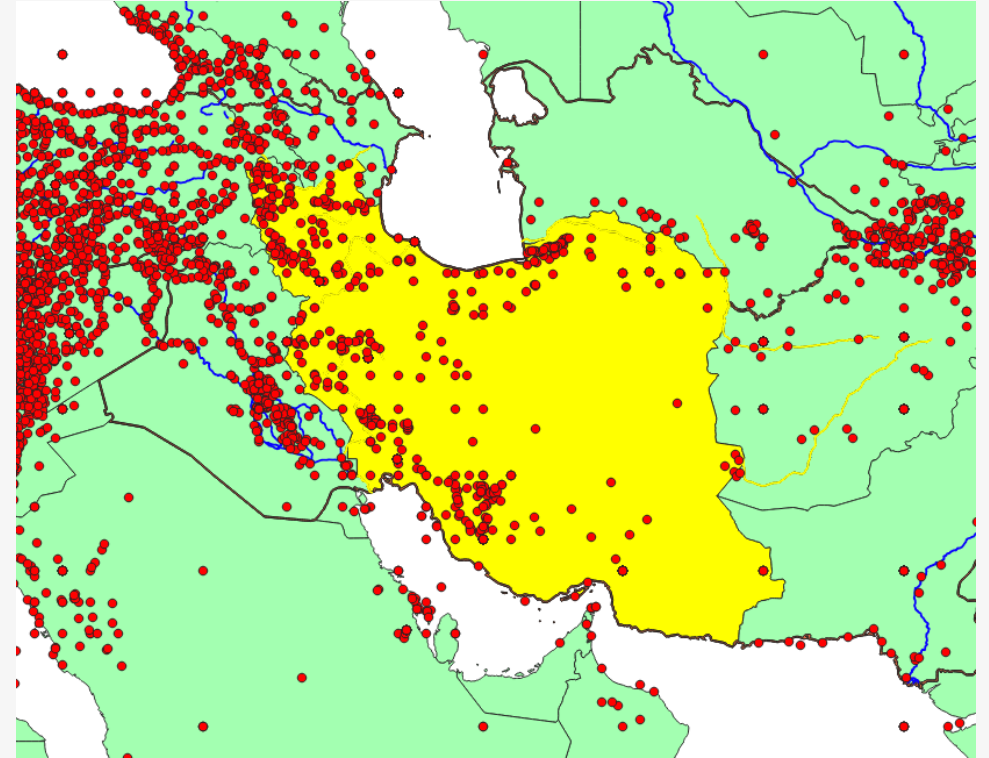
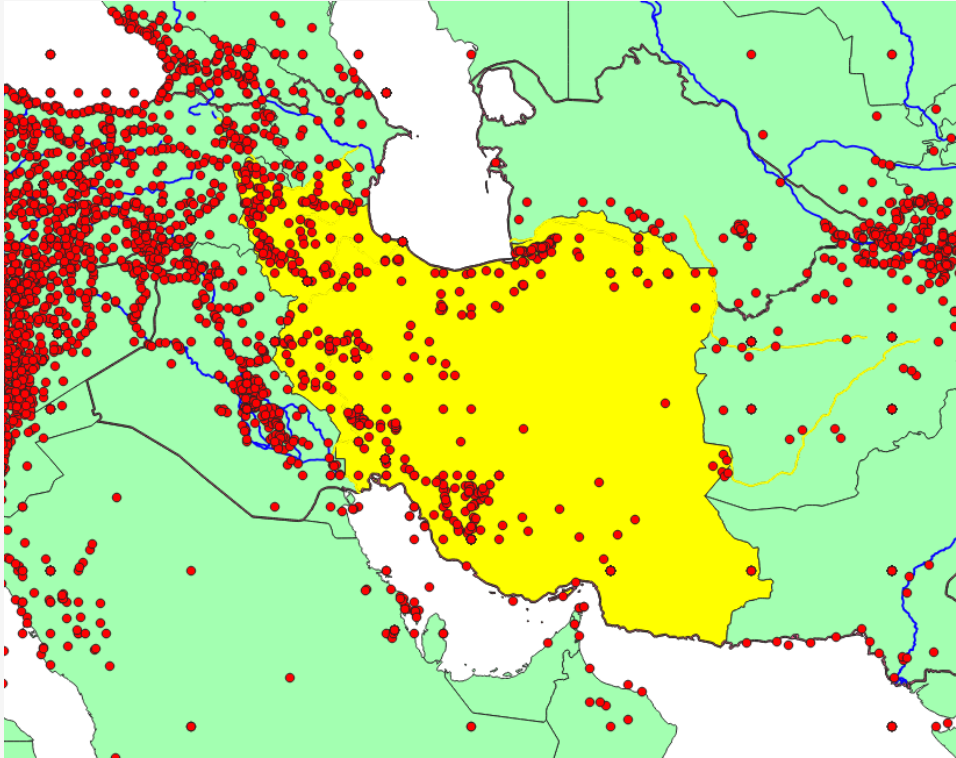
6. Select rivers and buffer (1km)



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Example

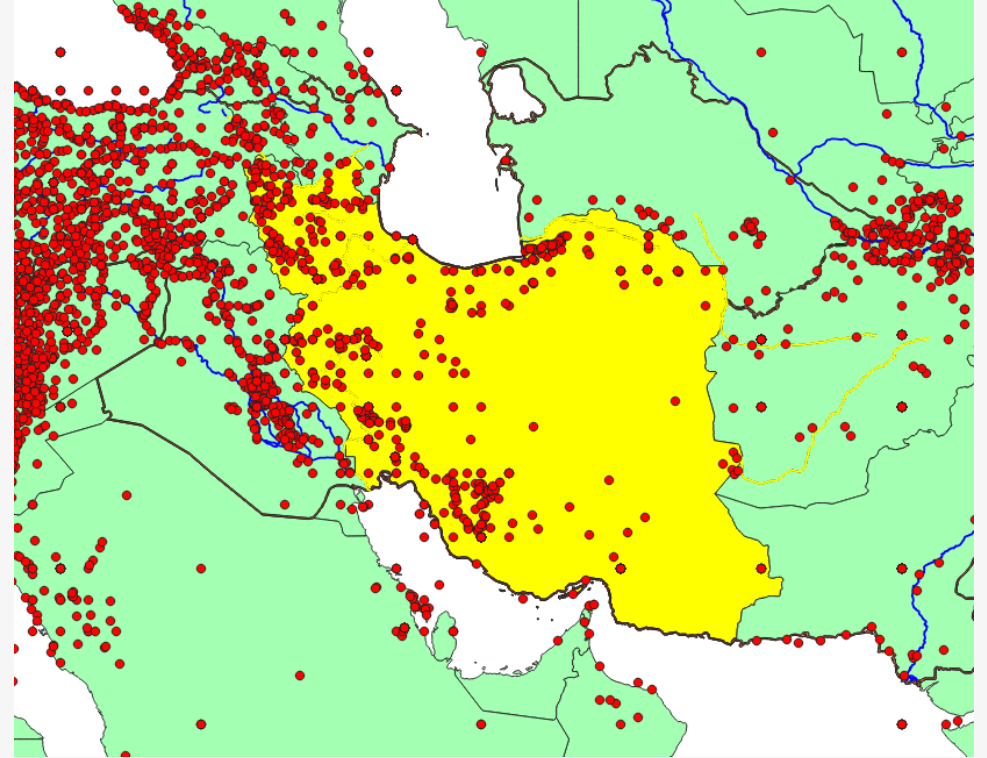
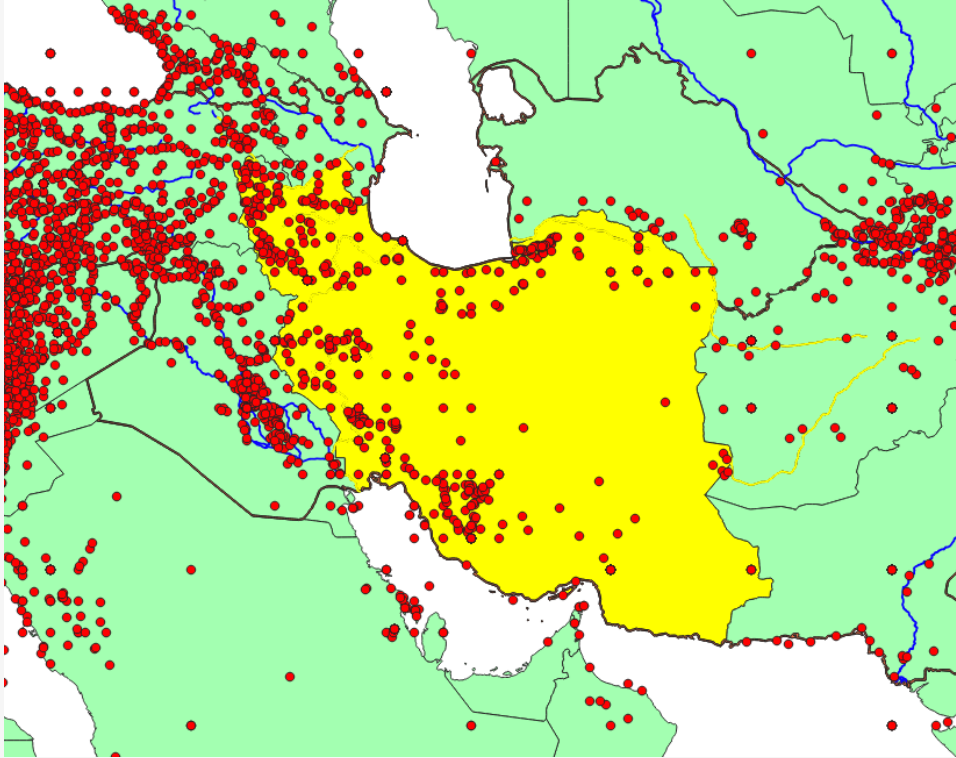
7. Union river buffers and coastal buffers



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Example

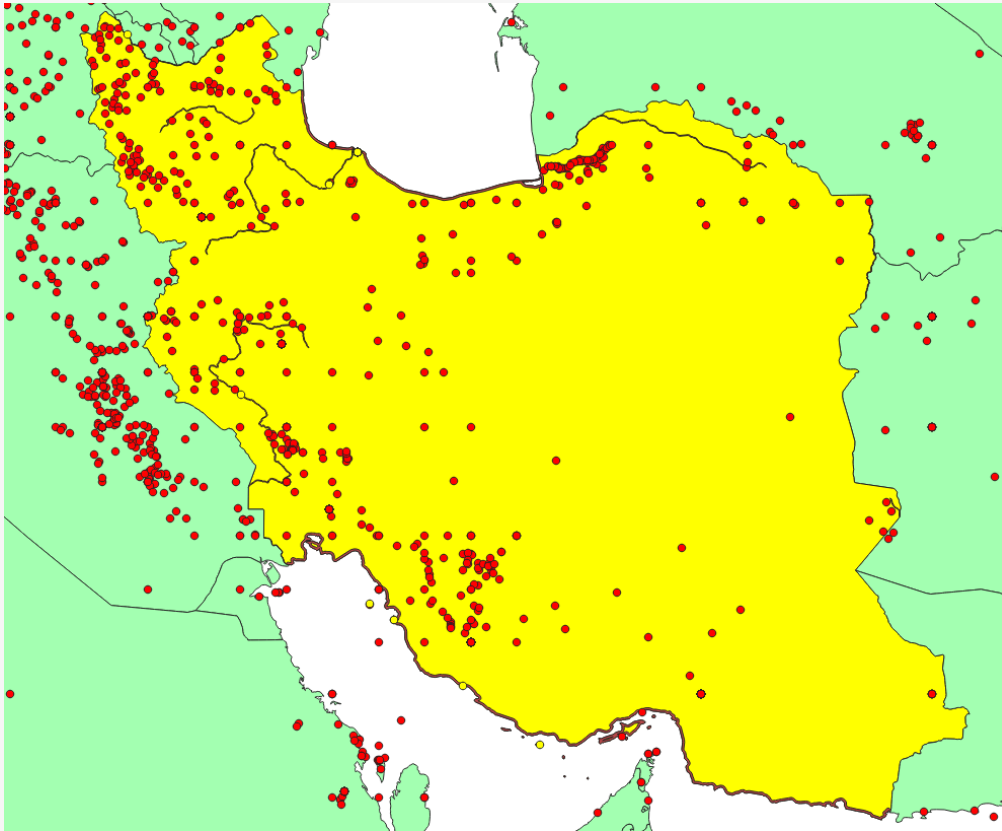
8. Clip union with Iran



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Example

9. Select sites that intersect with resulting polygon



Example

Result

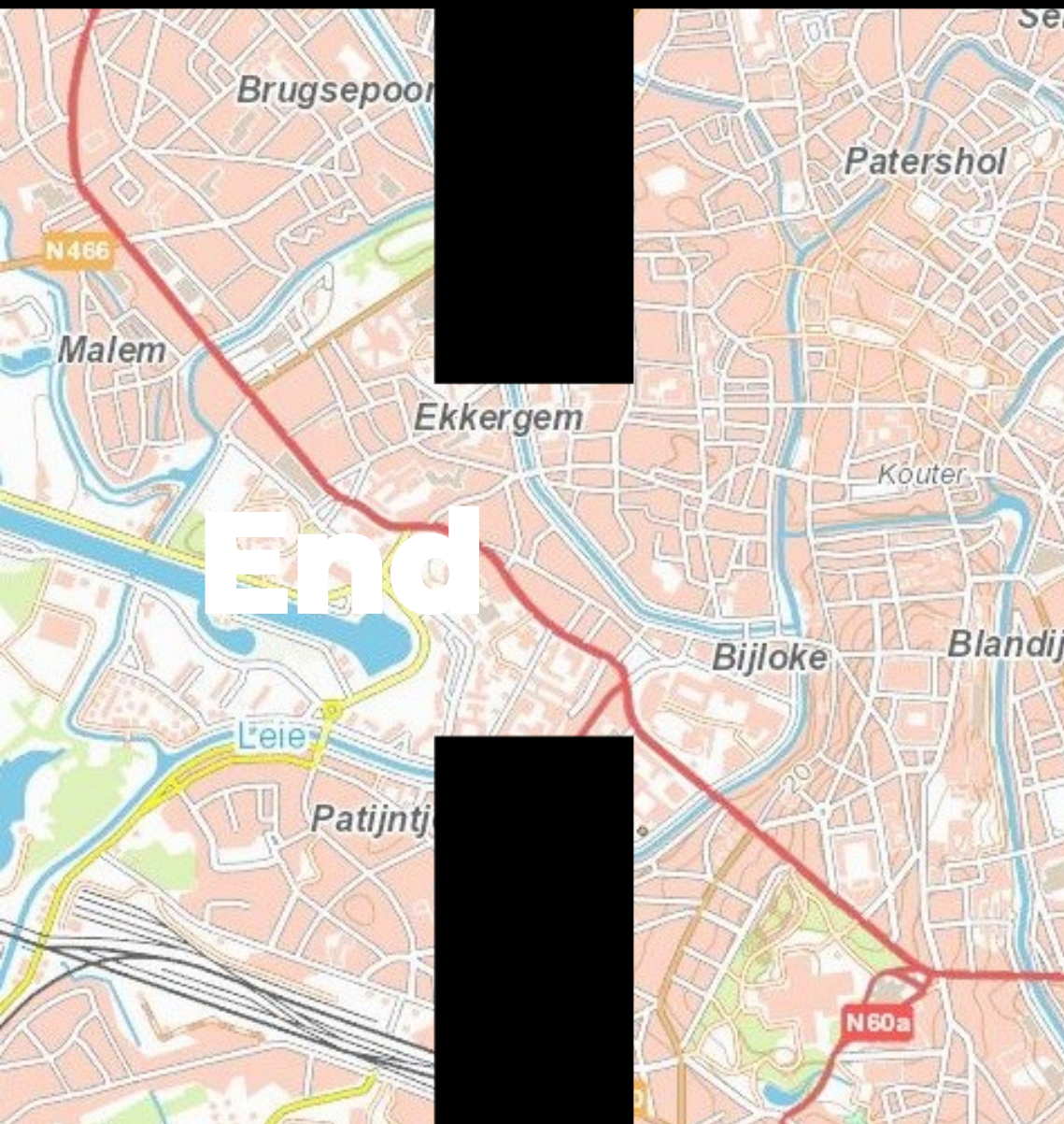


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Resume

Make extraction from 'AncientPlaceNames_Pleiades' within Iran that are at least 1 km near a major river or at least 5 km from the sea:

1. Transform data to Pseudo Mercator (EPSG:3857)
2. Select Iran and neighboring countries
3. Dissolve administrative boundaries
4. Buffer (-5km) with administrative boundaries
5. Symmetrical difference between dissolve and buffer
6. Select rivers and buffer
7. Union river buffers and coastal buffers
8. Clip union with Iran
9. Select sites that intersect with resulting polygon



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