# Vector Analysis and Geoprocessing

Ehsan Bhuiyan, Grace Dines

NOAA / Climate Prediction Center - International Desks

Fiji Pacific Climate Early Warning Workshop

Fiji, 15 – 24 July 2023

# Vector Analysis

- Most functions are available from the menu `Vector`

- Some functions are accessible through different menus

- **Common vector analyses include** `digitization` **and** `geoprocessing`

# Digitization

- Digitization is the process of converting geographic data on a map into vector data by editing the features

- Coordinates are converted into digital format

- Example of digitization: Creating a new shapefile
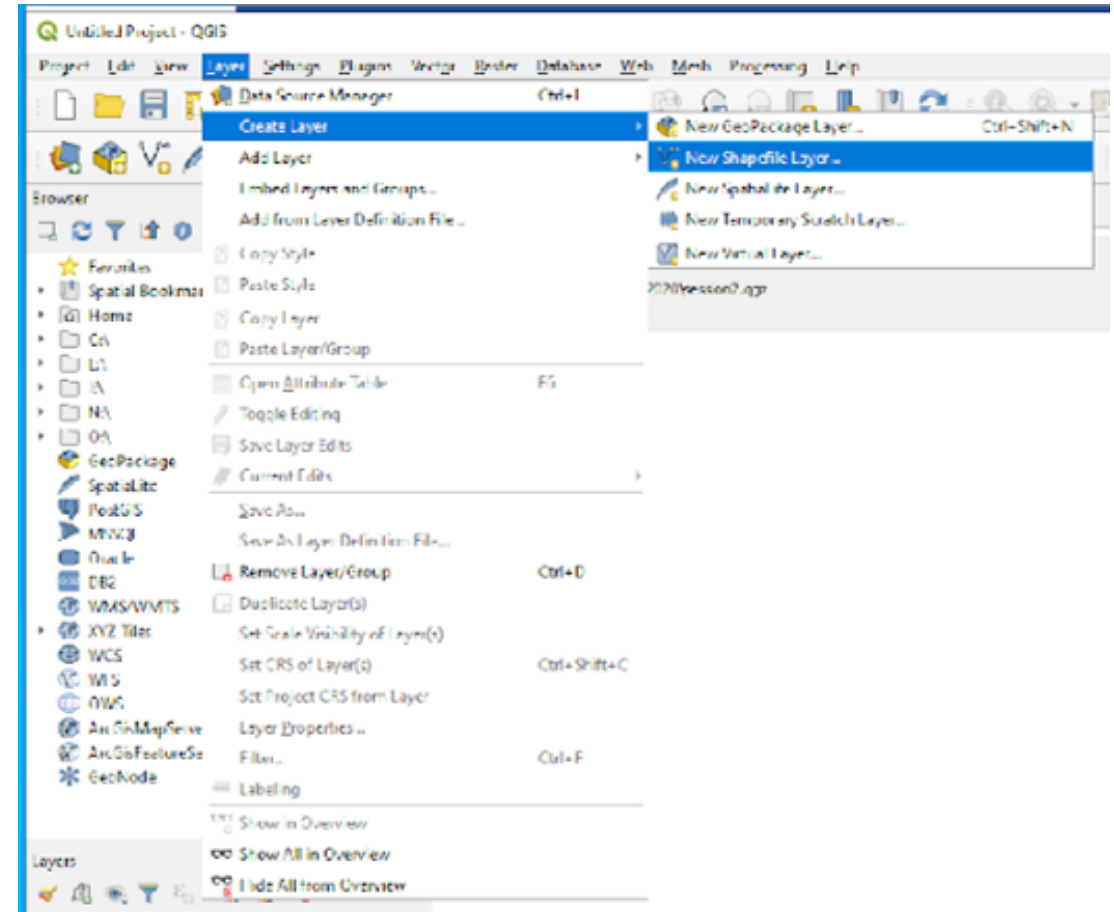
# Geoprocessing

- `Geoprocessings` are operations that can be done on/to GIS data

- The operation is possible because of the geospatial nature of the data

- `Geoprocessings` are used to solve real world problems, e.g. in environmental science, meteorology, urban planning, emergency management, etc.

- **Examples of** `geoprocessings` **include** `joins`, `intersections`, `dissolves`, `clip`, `buffers`, **etc.**
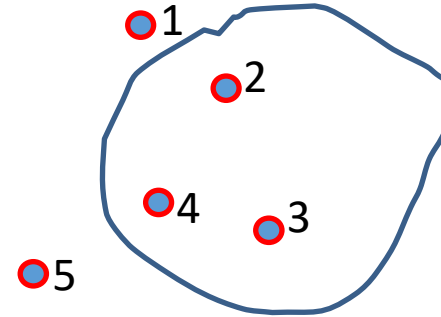
# Intersection

- `Intersection` is the area where spatial data overlap

- Writes intersections as features (points, lines, or polygons) to output
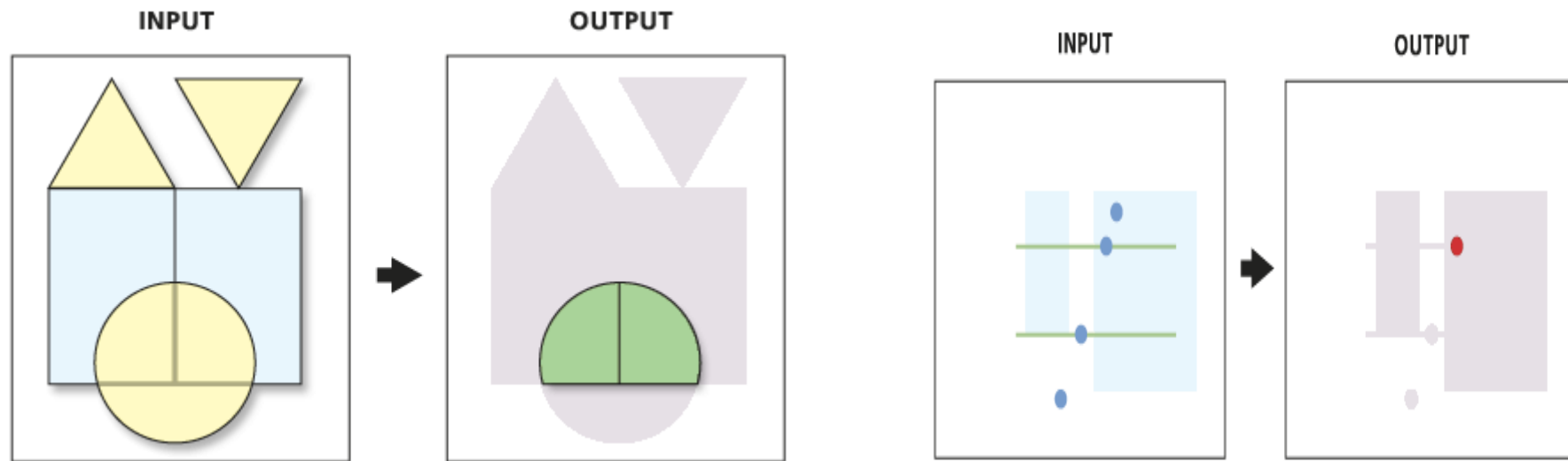
# Spatial Joins

- Joins `attributes` based on co-location

- Spatial joins are classic GIS problem

- Transfer `attributes` from one layer to another one based on spatial relationship

| Point | Value |
|-------|-------|
| 1 | 0.9 |
| 2 | 1.5 |
| 3 | 0.5 |
| 4 | 1.5 |
| 5 | 1.1 |

| Polygon | Hazard |
|---------|--------|
| 1 | TSTM |
| | |
| | |
| | |
| | |

| Point | Value | Hazard |
|-------|-------|--------|
| 1 | 0.9 | NULL |
| 2 | 1.5 | TSTM |
| 3 | 0.5 | TSTM |
| 4 | 1.5 | TSTM |
| 5 | 1.1 | NULL |

# Table Joins

- Similar to spatial joins, but join `attributes` from one data to another

- Join is based on common `attributes`

| Name | Number |
|------|--------|
| Tom | 123 |
| Matt | 456 |
| Wassila | 789 |
| Joe | 321 |
| Dave | 654 |

| Grade | Number |
|-------|--------|
| A | 123 |
| B | 789 |
| B | 321 |
| C | 654 |
| D | 456 |

| Name | Number | Grade |
|------|--------|-------|
| Tom | 123 | A |
| Matt | 456 | D |
| Wassila | 789 | B |
| Joe | 321 | B |
| Dave | 654 | C |
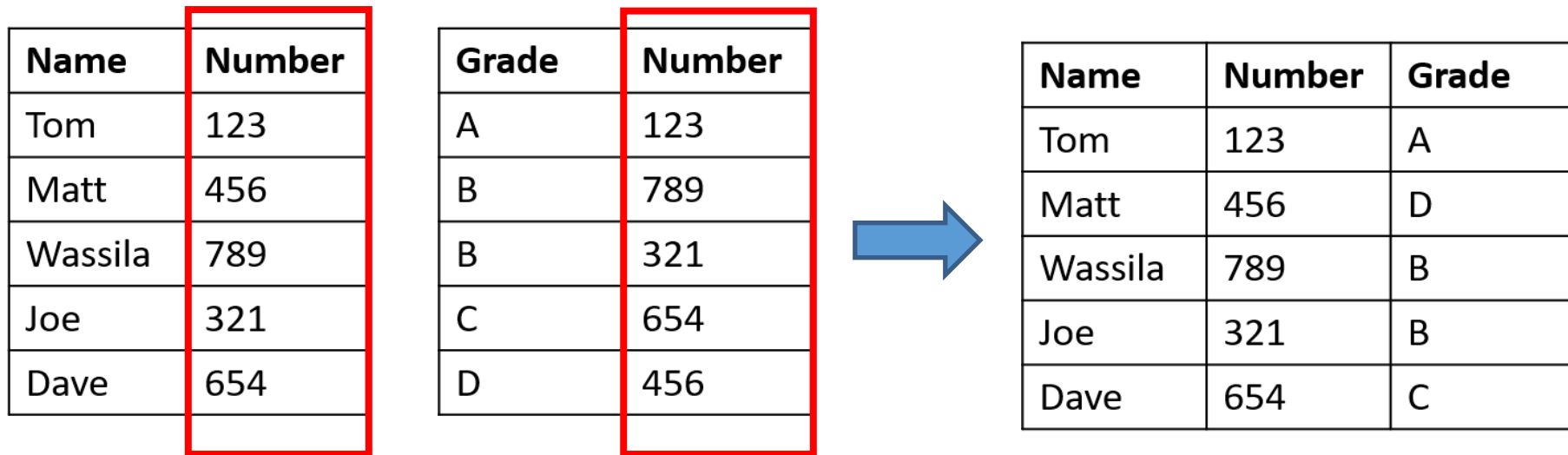
# Practice

- Drawing points and polygons

- Performing a `spatial join`

- Performing an `intersection geoprocessing`