PRACTICAL EXERCISE 8: Advanced Spatial Analysis

Introduction

In this exercise you will learn how to use some advanced spatial analysis techniques to gain further insight into abandoned mine locations Wales. You will find data for this exercise on the L: Drive in the normal place.

This instruction sheet should be read in conjunction with the document *GIS_guide_to_practical_exercises* which gives general information about QGIS and how to find further help.

Learning aim

In this exercise you will learn how to buffer, intersect and clip data to identify potential road sections at risk from historical mining activities. We will use data from the Lle geoportal and open data describing rivers and roads from the Ordnance Survey. You will use advanced spatial analysis techniques including buffer, union and clip to combine and extract areas of interest.

Instructions

Startup and data preparation

1) Launch QGIS and create a new project. Load the data from the mines, roads and rivers folders using the *add vector layer*. Note that these data come in the *GeoPackage* format (rather than Shapefiles).
2) Notice that the GeoPackage layer has the styling for the layer embedded – this a feature of *GeoPackage* layers.
3) Explore the location of the mines – we will be identifying sections of major roads which may be vulnerable to mine collapses.

Buffering mine locations

4) To identify areas of major roads we want produce a measure of proximity to mine locations. We can do this using a technique called *buffering*. Go to the *vector > geoprocessing tools > fixed distance buffer*
5) Set the distance to be 1000m and check the *Dissolve Result* check box. Save the output as a *GeoPackage* file.
6) Save your Project - Remember to save regularly from now on.
7) Explore the resulting buffer layer – you will notice that some of them intersect with major roads.

Buffering River locations using a multiple buffer

8) One of the environmental factors that can trigger ground instability is flood events. We can use the buffer tool to create simple flood zones for different magnitude events. Open the buffer tool again and fill in the parameters – you will need to create buffers for 500m and 1000m (hint: you can use the *Run as batch process…* for this).

Creating a combined risk zone

9) We have created three simple risks zones using Euclidean buffers – one for mines at 1000m and two for flooding at 500m and 1000m. We want to identify where we these risk zones coincide or intersect to create a potential ground instability zone. Go to the *vector > geoprocessing tools > intersection* tool and create two risk zones for the where the mine buffer and the 500m and 1000m flood events coincide. (hint: you can use the *Run as batch process…* for this).
10) Explore the outputs to see how these zones coincide with major roads across the study area.

Clipping road layer to combined risk zone

11) We now have combined risk zones for 500m and 1000m flood events and mining areas. We can use these zones to identify roads at risk to mine collapse and ground instability. Use the clip tool *vector > geoprocessing tools > Clip* to clip the roads layer using the 500m and then 1000m risk zones. (hint: you can use the *Run as batch process…* for this).

12) We can then use the summary statistics tools *vector > analysis tools > Basic statistics for numeric fields* to sum the total length of roads that are potentially vulnerable to damage given their proximity to former mines and flood events. Fill in your answers below:

500m flood event: m

1000m flood event: m

Optional Extra

Can you work out how to calculate the length of A roads vulnerable to mine collapse and flood events?

Learning outcomes

By the end of this exercise you should:
1) Be able to use buffers
2) Be able interest data
3) Be able to clip data
4) Be able to use the batch process tools in QGIS and create summary statistics