SGIS
Example exercise

December 10, 2014

1 Introduction

In this excercise you will use SGIS to find a suitable place in Trondheim to live. You have one strict criterias, the house should be within 1.5 kilometres from Gløshaugen. Additionally you would prefer if you could live close to water.

We will find the number of addresses which fulfills the following criterias:

- Within 1.5 kilometres from Gløshaugen
- Within 1.5 kilometres from Gløshaugen and within 200m of water
- Within 1.5 kilometres from Gløshaugen and within 100m of water

Additionally you will create a graphic showing the results.

The steps below are only one possible solution, other procedures are also possible.

2 Importing data

Add the files roads.shp, addresses.shp and area.shp to your map. Using the arrows beneath the layer list, sort them such that the addresses and roads are shown on top. Right click each layer and select *Style* to give the layers different colors.

3 Locating Gløshaugen

Select the layer containing addresses, and then, using the selection pointer, select one or more addresses at Gløshaugen. If you find it hard to locate, try using the *WMS* tool to add a background map. You'll want to hide or reduce the opacity on the other layers in order to see the map beneath. When you are done selecting, click Clear in the *WMS* tool to remove any background maps you have loaded.

Use *Copy* to copy your selection to a new layer. Name it 'gløshaugen'.

4 Extracting water

Now we want to extract all the polygons which represents water, either river or sea. Then we'll copy these to a new layer. To do this, we will use the *Select* tool *Attribute*. First, select the area layer and using the *Info* tool click on different polygons in the layer. Try to see what kind of attributes this layer have, and what the values of these attributes are.

Next, use the *Attribute* tool to select all polygons where the `OBJTYPE` attribute is either `'ElvBekk'` (river) or `'Havflate'` (ocean). This can be accomplished with the expression

```
[OBJTYPE] = 'ElvBekk' OR [OBJTYPE] = 'Havflate'
```

When you have selected the correct polygons, use *Copy* to copy these to a new layer. Let's call it 'water' and give it a blue color.

You should now have 5 layers:

- addresses
- roads
- area
- gløshaugen
- water

5 Creating a buffer around Gløshaugen

Selecting the layer named 'gløshaugen' open the *Buffer* tool. We want a buffer with the distance 1.5km or 1500m, so enter that into the distance textbox. Name the new layer 'gløshaugen_buffer' and click Buffer.

If you in step 3 selected more than one address, you may have noticed that our new layer containes several large circles almost on top of eachother. Use the *Union* tool to create one large circle instead. Name this layer 'gløshaugen_buffer_union' and delete 'gløshaugen_buffer'. Then rename 'gløshaugen_buffer_union' to 'gløshaugen_buffer'.

It might be a good idea to reduce the opacity of this layer so we can see the addresses beneath.

6 Creating a buffer around the water

Using the same procedure as in the last step, create two buffers around the layer 'water'. Only this time use 100m and 200m and give them the names 'water_buffer_100' and 'water_buffer_200' respectively. Using the *Union* tool is also adviced here, as it will speed up coming operations and provide a cleaner look.

7 Extracting addresses

Select the layer 'gløshaugen_buffer' and open the *Intersection* tool. Choose to intersect with the layer 'addresses' and give the new layer the name 'gløshaugen_addresses'.

Using the same procedure, create the layers 'water_200_addresses' and 'water_100_addresses' by intersecting the layers 'water_buffer_200' and 'water_buffer_100' with the layer 'gløshaugen_addresses'.

8 Removing overlap

Currently 'gløshaugen_addresses' contains addresses that are also present in 'water_100_addresses' and 'water_200_addresses'. By using the *Subtract* tool, subtract all points in 'water_200_addresses' from 'gløshaugen_addresses' and name the new layer 'gløshaugen_addr_only'. Also, subtract all points in 'water_100_addresses' from the layer 'water_200_addresses'. Name this layer 'water_200_addr_only'.

You should now have 13 layers:

- addresses
- roads
- area
- gløshaugen
- water
- water_buffer_100
- water_buffer_200
- gløshaugen_buffer
- water_100_addresses
- water_200_addresses
- gløshaugen_addresses
- gløshaugen_addresses_only
- water_200_addr_only

9 Results

Use the *Measure* tool to answer the numbers we requested in the introduction. That is, we want the number of points in the layers 'gløshaugen_addr_only', 'water_200_addr_only' and 'water_100_addresses'.

Then, give the addresses different colors based on which criterias they fulfill and create a graphical representation of the results. Finally export your result as a raster image with the *GeoTiff* tool. Your result could look something like this.