PA2 Update

Modelling Wildlife Corridors

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Progress

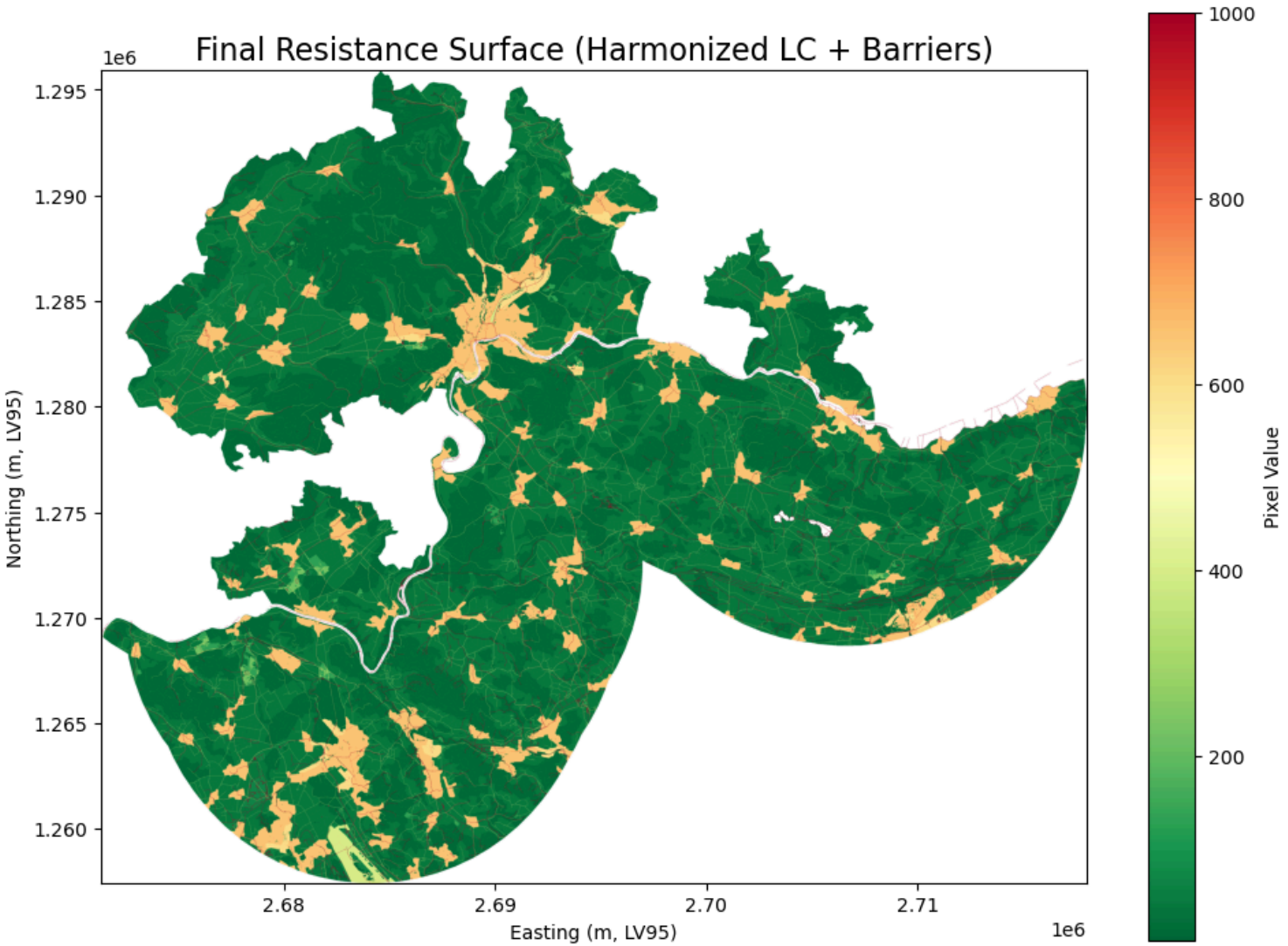
Overview

- Optimized Cost Surface Model
- Apply correct Cost Values
- Started writing Report
- Implement Least Cost Analysis
- Plot deer traffic map

Cost Surface Model

- Buffer, Canton borders and clip it to national borders
- Buffer Linestrings (water and road)
- Define Mastergrid for aligning the Raster Layers
- Rasterize Landcover Layers first, then apply a priority fill with np.where()
- Combine Layers with maximum logic

Cost Surface Model



Final Resistance Surface containing Landcover types, Water, Roads

Apply correct Cost Values

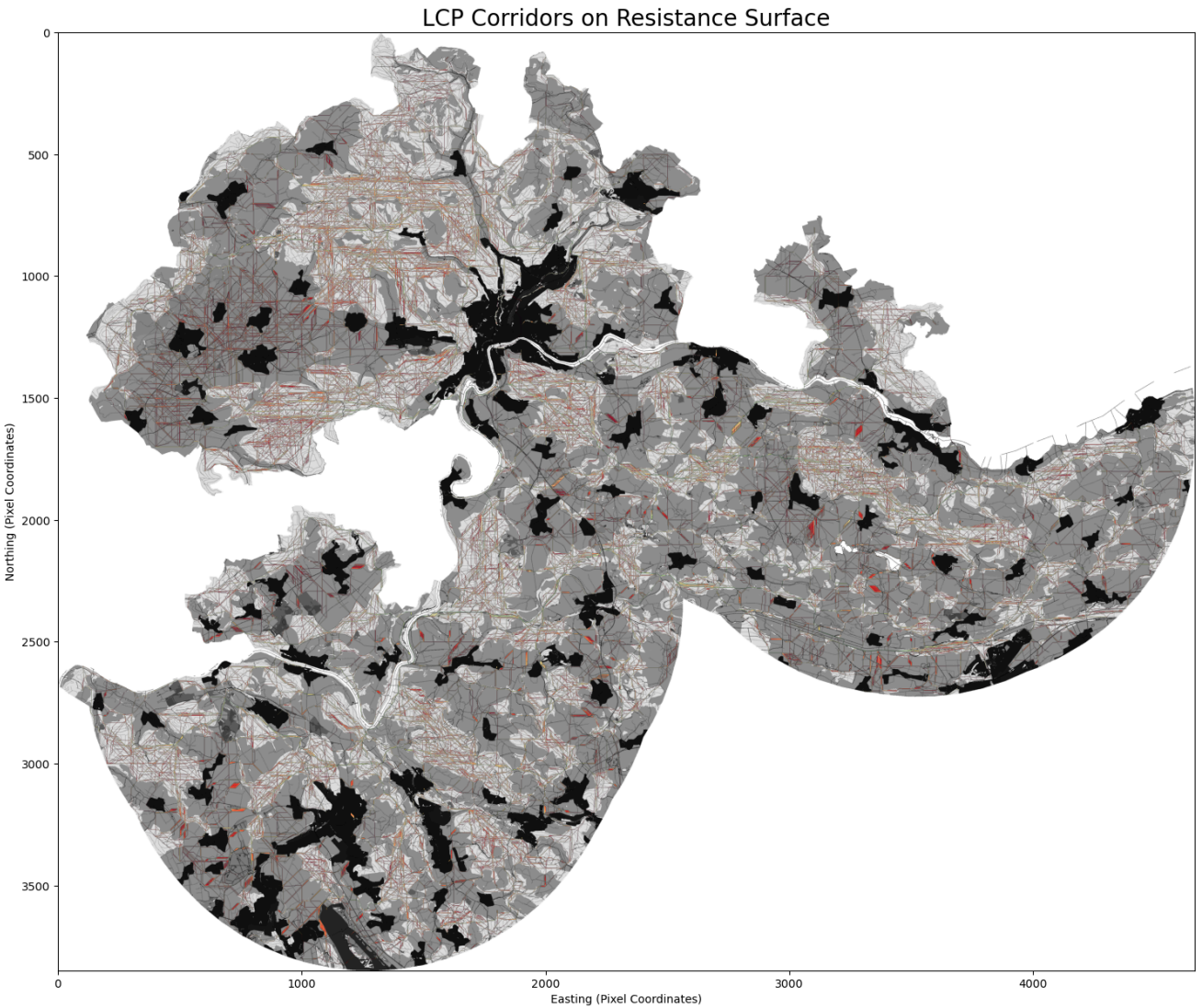
```
layer_type,objektart,resistance_cost
landcover_summary,Forest,5.0
landcover_summary,Shrubland/Transitional,20.0
landcover_summary,Open Forest/Edge,10.0
landcover_summary,Agriculture,40.0
landcover_summary,Grassland/Pasture,50.0
landcover_summary,Wetland,65.0
landcover_summary,Bare Rock/Soil,130.0
landcover_summary,Urban/Built-up,650.0
landcover_summary,Industrial/Commercial,600.0
landcover_summary,Infrastructure/Built-up,400.0
landcover_summary,Extraction/Bare,225.0
water,Druckleitung einfach,300.0
water,Fliessgewaesser,1000.0
water,See,1000.0
water,Seeachse,1000.0
water,Seeinsel,50.0
water,Trockenrinne,80.0
roads,10m Strasse,1000.0
roads,"1m Weg",40.0
roads,"1m Wegfragment",45.0
roads,"2m Weg",60.0
roads,"2m Wegfragment",65.0
roads,"3m Strasse",250.0
roads,"4m Strasse",350.0
roads,"6m Strasse",650.0
roads,"8m Strasse",850.0
roads,Ausfahrt,700.0
roads,Autobahn,1000.0
roads,Autostrasse,900.0
roads,Dienstzufahrt,300.0
roads,Einfahrt,700.0
roads,Faehre,1000.0
roads,"Markierte Spur",10.0
roads,Platz,150.0
roads,Raststaette,400.0
roads,Verbindung,200.0
roads,Zufahrt,400.0
```

Cost Values assigned to different classes

Implement Least Cost Path Analysis

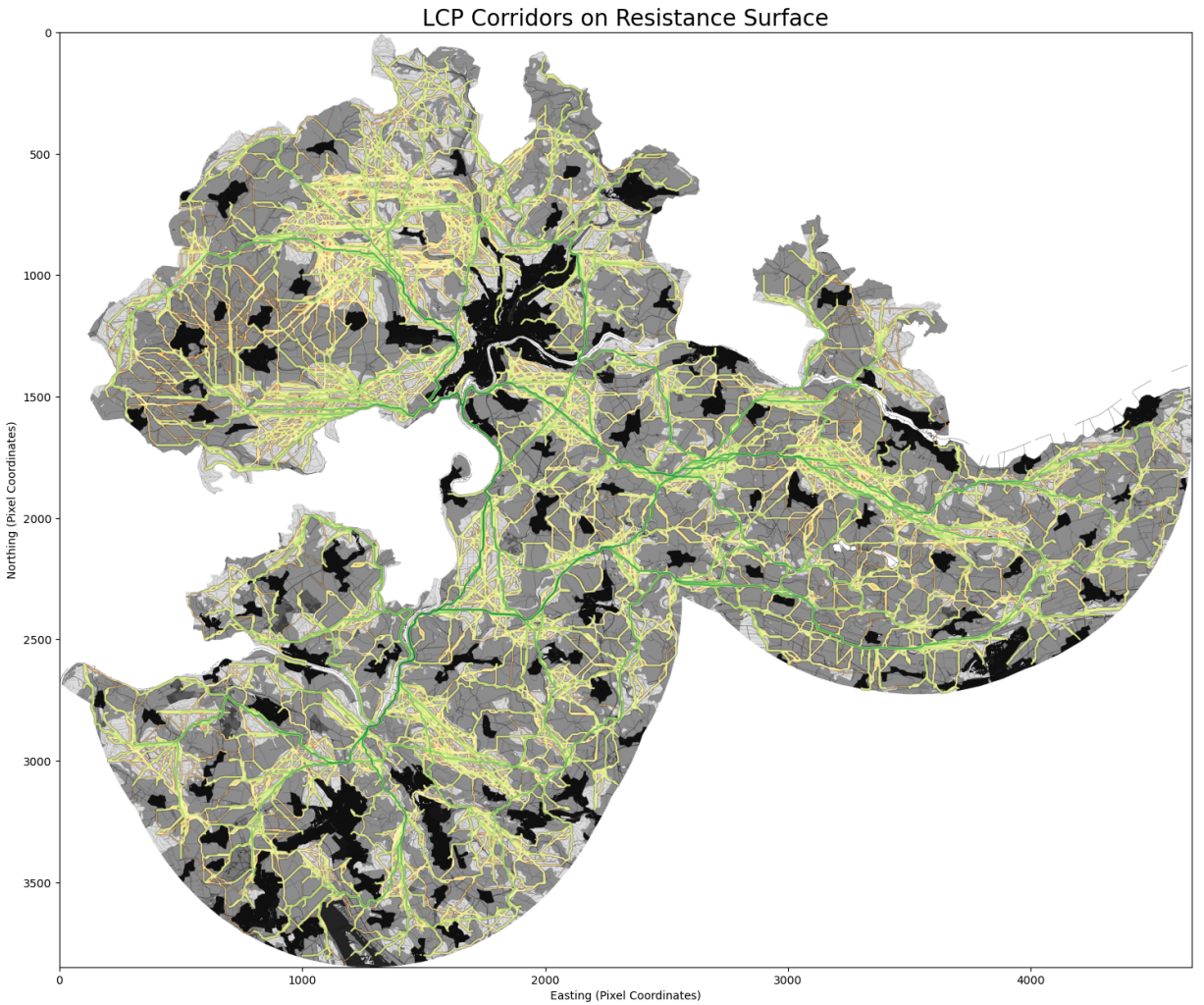
- `skimage.graph.route_through_array()`
- `skimage.graph.MCP_Geometric()` is much faster
- Based on dijkstra algorithm
- Calculations on HPC using Job Array
- 1 km grid

Implement Least Cost Path Analysis



Least Cost Path Corridors with 1km grid

Implement Least Cost Path Analysis



Least Cost Path Corridors on the Cost Surface visualizing the main deer paths in the observed area

Challenges

No Data for Germany

SwissTLM3D only offers data for Swiss teretory, while Corine Landcover also delivers data for Germany. But only Landcover for Germany, no Water or roads data.

- Therefore, I had to adjust my function, first to include the buffer and second to clip the area to the swiss national border.

Water and Roads Buffer

The water and roads layer are linestrings and therefore difficult to rasterize.

- I buffered the layers so that they are polygons.

Handling no Data Values

I had problems by handling the no Data values in the cost surface model.

- I’ve set them to a fixed value of -9999

Cost definition

It is relatively difficult to determine the costs for the different types of landscape, water, and roads.

- I choose values with respect to literature

Correct Least Cost Path calculation method

There are different suitable methods, like `skimage.graph.route_through_array()` or `scipy.sparse.csgraph.dijkstra()` or `skimage.graph.MCP_Geometric()`

- I decided to work with `skimage.graph.route_through_array()` because, it was the only methode which provided good results.

Starting on the HPC and definition of grid size

I had problems by defining the best possible Grid Size

- I used a 1km grid size as it provides detailed info but doesn’t take too long to calculate.

Next Steps

- Improve Least Cost Path Analysis Code
- Continue writing the Report
- Define deer Habitats
- Search for Bottlenecks
- Add the Steepness from the SwissAlti3D Dataset as a next Cost Surface to the model.