Exercise 4A Point to nearest point:

- 1. From folder Exercise 4 load
 - African Countries
 - Landing_Stations
 - Cables
- 2. Check CRS
- 3. Calculate Centroids

Vector|Geometry Tools | Polygon Centroids





- 4. Save new Layer as African_centroids
- 5. Use the "Distance to nearest hub" tool to find the nearest point on the nearest landing station.

Processing | Search for "Distance to nearest hub"

Source points layer African_centroids [EPSG:4326] Destination hubs layer Landing_Stations [EPSG:4326] Destruction and attribute Hub layer name attribute African_centroids [EPSG:4326] African_centroids [EPSG:4326]	Given a layer with source point and another one representing destination points, this algorithm computes the distance between each source point and the closest detination one. The resulting layer can contain only source points with an additional field
Country Output shape type Line to hub Measurement unit Kilometers Hub distance [Create temporary layer] Open output file after running algorithm	indicating the distance to the nearest poi and the name of the destination point, or lines linking each source point with its nearest destination point.

6. This creates the new layer "Hub distance"



- 7. Check the attribute Table of Hub Distance. Does it contain all the information we need?
- 8. Use the NNjoin plugin

•	0	NNJoin
	In	put vector layer
	(African_centroids_Landing_Stations
	Jo	in vector layer
		African_centroids_Landing_Stations
		Join prefix: join_
	0	utput layer
		African_centroids_Landing_Stations_African_centroids_Landing_Stations
		Neighbour distance field: distance
	(Cancel Close OK Help

9. Check the attribute table.

DIY Exercise 4B Distance Matrix:

1. From folder Exercise 4 load

- KEN_adm2

- 2. Generate Centroids
- 3. Save Centroid Layer
- 4. Calculate Distance Matrix

Vector | Analysis Tools | Distance Matrix

Note (Distance is in degrees) You could multiply distance in degrees by 111. This is the conversion rate between degrees and kilometres at the equator.

Exercise 4C Point to nearest polyline:

- 1. From folder Exercise 4 load
 - African Countries
 - 10m coastline



2. Convert Coastline polylines to points. Processing | Search for "Convert lines to points



3. Use Distance to Hub tool



4. We only need the points on the coast that are the nearest to the respective country's capital.



5. Zoom in



6. Save as "Africa_coast_nearest"

Save only selected features

7. Add coordinates of each point (required if you want to calculate distance to Slave Trade centers later on, in stata?)

Vector | Geometry Tools | Export/Add Geometry Tools

8. Use NNjoin to join information from the country_centroids

• • •	🕺 NNJoin
Input vector layer	
Hub distance	Geometry type: LineString Selected only
Approximate geometries by cent	roids
Join vector layer	
Africa_coast_nearest	Geometry type: Point Selected only
✓ Use index	Join prefix: join_
Output layer	
Hub distance_Africa_coast_nearest	t
Neig	hbour distance field: distance
	Cancel Close OK Help

9. Save layer.

Exercise 4D Buffer:

- 1. From folder Exercise 4 load
 - Kenya Schools
- 2. Change CRS to projected CRS WGS 1984 / UTM 36 N

Find fitting UTM zone for your area here http://www.dmap.co.uk/utmworld.htm

Save Layer and Change CRS

Change CRS of the Project as well

3. Vector | Geoprocessing Tools | Fixed Distance Buffer

	🕺 Fixed distance buffer	
Parameters Log	Run as batch process	Fixed distance buffer
Input layer	6261	This algorithm computes a buffer area for all the features in an input layer, using a fixed distance.
Distance	500j <u>v</u> V	
300.000000		
Segments		
5	\$	
✓ Dissolve result Buffer		
[Create temporary layer]		
Open output file after running al Open output file after running al	gorithm	
		Close Run

Create 1 Buffer with a radius of 300 and one with a radius of 1000 (in meters)



Exercise 4e Map Algebra – Calculating Ruggedness:

There are many differente Terrain ruggedness measures. http://gis4geomorphology.com/roughness-topographic-position/

For this exercise we are gong to calculate the Relative Topographic Position

RTP = (DEMmean – DEMmin)/(DEMmax-DEMmin)

- 1. From folder Exercise 4 load - raster KenyaDEM
 - vector KEN_adm2
- 2. Calculate Focal statistics using the processing tool r.neighbours

Processing | search for "r.neighbours"

ter layer	
DEM [EPSG:4326]	○
hood operation	
)	•
hood size	
	÷ •
GIS 7 region extent (xmin, xmax, ymin, ymax) lank to use min covering extent]	
GIS 7 region cellsize (leave 0 for default)	
0	.
nced parameters	

Calculate 3 new raster

KenyaDEM_min, KenyaDEM_max, KenyaDEM_mean

3. Use the Raster Calculator to calculate the RTP

10s030e_20101117_gmted_mea300@1 KenyaDEM_max@1	Output layer op/GIS for Economists/KenyaTRI
KenyaDEM_mean@1	Output format GeoTIFF
Neighbors@1	Current layer extent
	X min 29.99986 C XMax 59.99986
	Y min -10.00014 C Y max 9.99986
	Columns 3600
	Output CRS Selected CRS (EPSG:4326, WGt)
	Add result to project
Operators	0
	ain tan lag10 (
+ sqn cos	
- / ^ acos	asin atan In)
< > = !=	<= >= AND OR
Pastar calculator expression	
"KenyaDEM_mean@1" - "KenyaDEM_mir	1@1") / ("KenyaDEM_max@1" - "KenyaDEM_min@1")

4 F. Viewshed Analysis (Preliminary Beta version)

Goal: Identify Areas with mobile phone coverage. Combine information about the location of Telecomm towers, their range and their height with DEM in a viewshed analysis:



- From folder Exercise 4 load

 raster KenyaDEM
 vector Kenya_Comms_Tower
- 2. Change Projection to WGS 84 / UTM N 36
- 3. Create Buffer with 50km radius



- Install Plugin "Viewshed Analysis"
 Plugins |Viewshed Analysis |Viewshed Analysis
 Choose observer height and search radius

🕨 💿 🔍 🥂 Advanced viewshed analysis				
	General	Reference	About	
Elevation raster		Outpu	ıt file	
KenyaDEM_UT	м	Econ enya	omists/Data/k _Comm_View	Kenya/K shed3
Observation point	s			
Kenya_Comms	_Tower		0	Browse
Target points (inte	rvisibility)			
[2		
Settings				
Search radius	50000)		
Observer height	10	or field:		\$
Target height	0	or field:		•
Adapt to highest point at a distance of:				
0 pixe	els for obser	rver 0	pixels for ta	arget
Output				
 Binary views 	hed	🔵 Invisit	oility depth	
Intervisibility			on OHor	izon full
Options				
Cumulative	(for raster o	output)		
Use earth cu	irvature	0.13	Atmospheric re	efraction
Precision		Normal	\$	
			Cancel	ОК

- 7. New output is raster.
- 8. Convert raster to vector.

Raster | Conversion | Polygonize

