

# A short introduction to GIS

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# Why use GIS? A Motivating Example

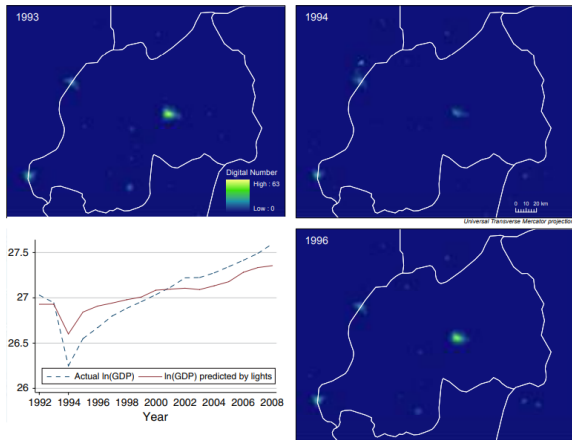


FIGURE 4. GENOCIDE EVENT: RWANDA

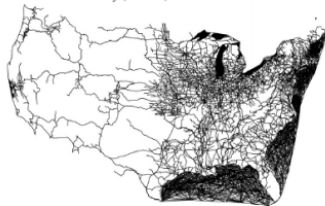
Henderson, Storeygard, Weil: Measuring Economic Growth from Outer Space (AER, 2012)

# Why use GIS? A Motivating Example

C. Natural Waterways, Canals, and 1870 Railroads



D. Natural Waterways, Canals, and 1890 Railroads



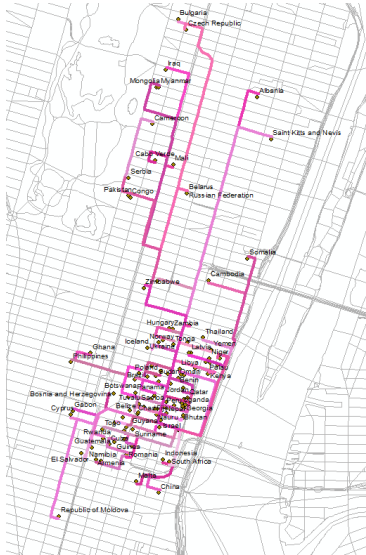
Donaldson & Hornbeck: Railroads and American Economic Growth (QJE, 2016)

# What can GIS be used for?

- Overlay and match different maps, e.g. locate school locations within school districts
- Match data across longer periods of time by tracking the change of borders
- Calculate geospatial features such as distances between e.g. villages, terrain ruggedness, and many more
- Network analysis: Which route to use under certain constraints
- ...

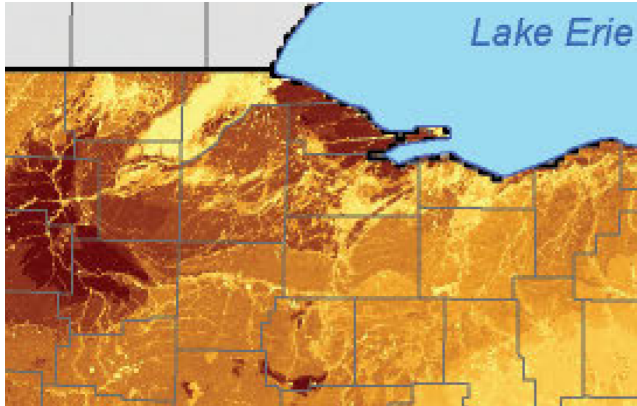
## Spatial data: Vector data

- Vector data: shapefiles ending in .shp: Polygons, polylines or points



# Spatial data: Raster data

- Raster data: usually .tif format



Source: USDA: Integrating Fine-scale Soil Data into Species Distribution Models

# Coordinate Systems

There are two types of coordinate systems:

- Geographic coordinate systems: Reference a shape on the globe in a two dimensional way: e.g. a map in an Atlas
- Projected coordinate systems: Reference a shape on the surface of the globe. This is sort of like wrapping a map from an atlas around a sphere and making adjustments so that it fits.
- A useful resource for choosing an adequate projection:  
[http://downloads2.esri.com/support/documentation/ao\\_/710Understanding\\_Map\\_Projections.pdf](http://downloads2.esri.com/support/documentation/ao_/710Understanding_Map_Projections.pdf)
- NOTE: You almost always want to work in a projected coordinate system. Otherwise many of your calculations will be complete garbage.

# Some notes on Arc

- It has many bugs
- Try doing things in Python from the start
  - Your steps are reproducible!
  - It does not break down as often as the Modelbuilder Tool
- Always make copies from your raw data and work on the copies only
- Shutting down and re-starting the program sometimes works to resolve an issue
- Arc does not like long filenames and will break down if you do use them
- Stackexchange and other forums will be your good friend for dealing with bugs and workarounds
- Only use gis for things you cannot do in other programs. Don't do major merges in Arc.



# Thank you

These slides are inspired by a GIS introduction class by:

Giorgio Chiovelli, Sebastian Hohmann and Elias Papaioannou from the London Business School.