



GIS - What it is, and Why You Should Use it

Ian Stearns

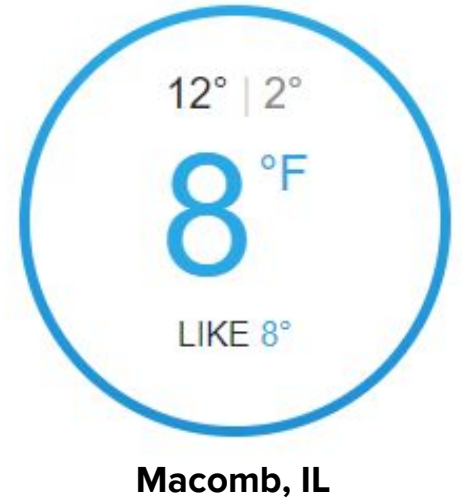
What is GIS?

- GIS is an acronym - Geographic Information Systems
 - Ok, so what is that?
- **Geographic Information System** - Any framework for gathering, managing, and analyzing spatial data
- GIS is a very powerful tool used in a number of disciplines
 - Any discipline that uses maps uses GIS



Spatial Data? What's so “spatial” about it?

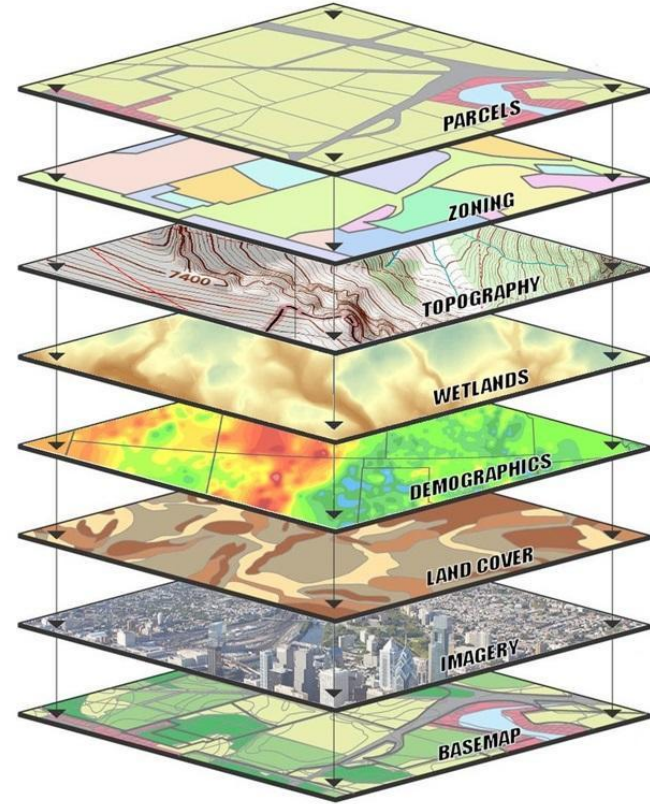
- **Spatial Data** - Any data with a spatial component
- Example: Temperature Data
 - Pretty meaningless on its own
 - Only gains meaning when paired with a location on Earth
- Other examples:
 - Tornadoes
 - People
 - Roads/Addresses
 - Elevation
 - Pressure
 - Countless other examples



GIS - Any framework for gathering, managing, and analyzing **spatial data**

How GIS Works

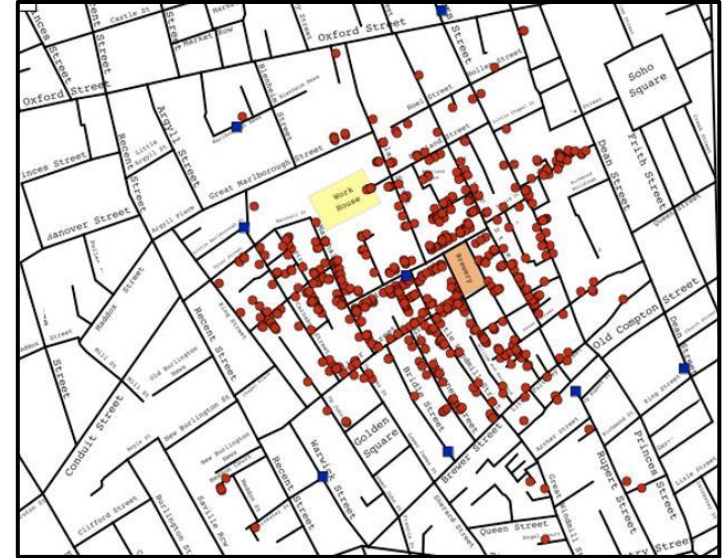
- First, you **gather** the spatial data
 - GPS
 - Weather Stations
 - Satellite Imagery
 - Digitize It Yourself
- Then, it must be **managed**
 - GIS Data is organized into layers
 - Layers each contain one type of spatial data
 - Ex. Road Layer, Elevation Layer
 - Layers are georeferenced
 - Then can be overlaid atop each other



GIS - Any framework for **gathering**, **managing**, and analyzing **spatial data**

Spatial Analysis

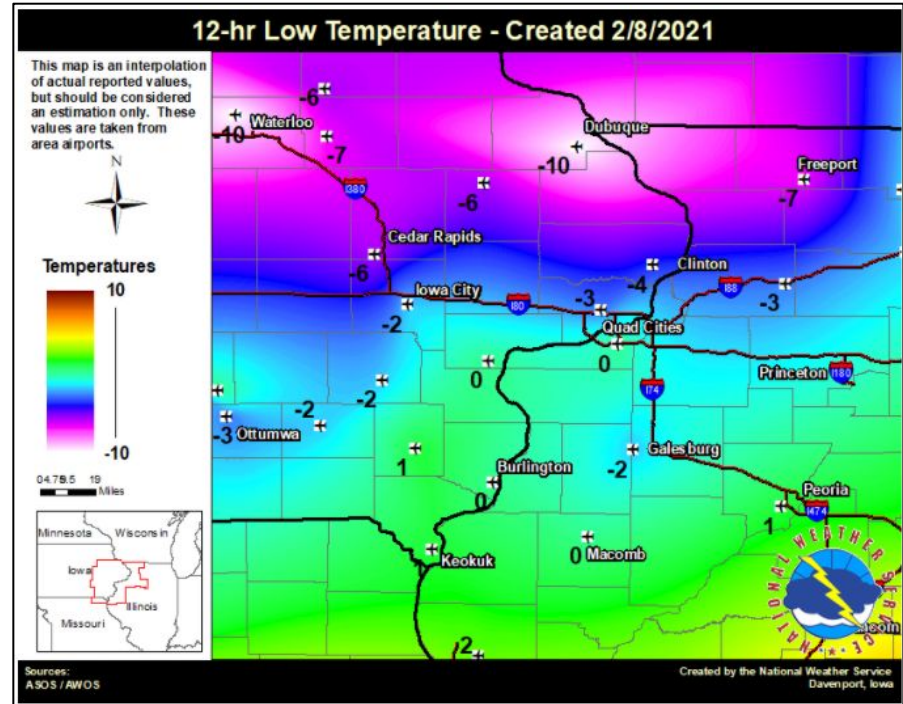
- Ok, so we know *where* things are
- What are the *relationships* between things?
- We use GIS to **analyze** (discover) these relationships
- Example - John Snow back in the 19th Century
 - Used a primitive form of GIS analysis to identify source of Cholera outbreak in Central London
 - Modern Day Analogy - Overlaying road, water pump, and Cholera Cases layers



GIS - Any framework for **gathering**, **managing**, and **analyzing spatial data**

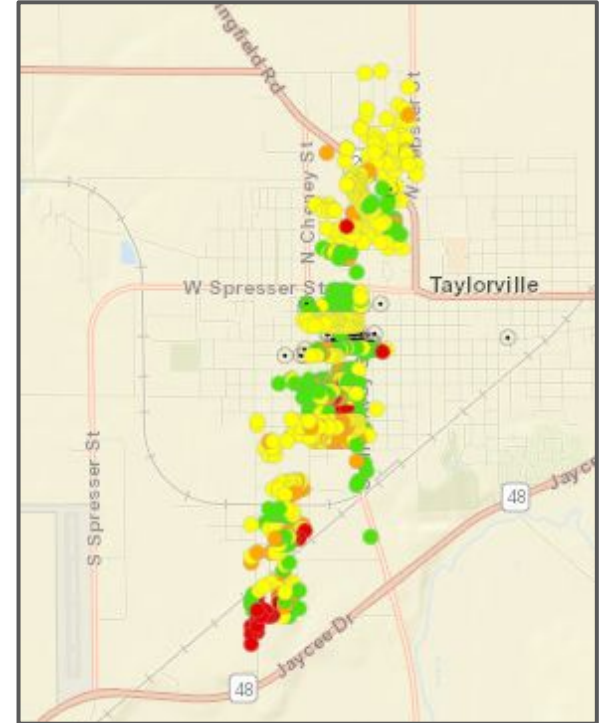
GIS in Meteorology

- Meteorology *is* GIS
 - Pretty much all weather data is inherently spatial
- Forecast models
 - Take in a bunch of spatial data
 - Outputs a forecast
- Weather Mapping
- Climate Mapping
- Mapping Tornado Paths
- Radar
- So many more



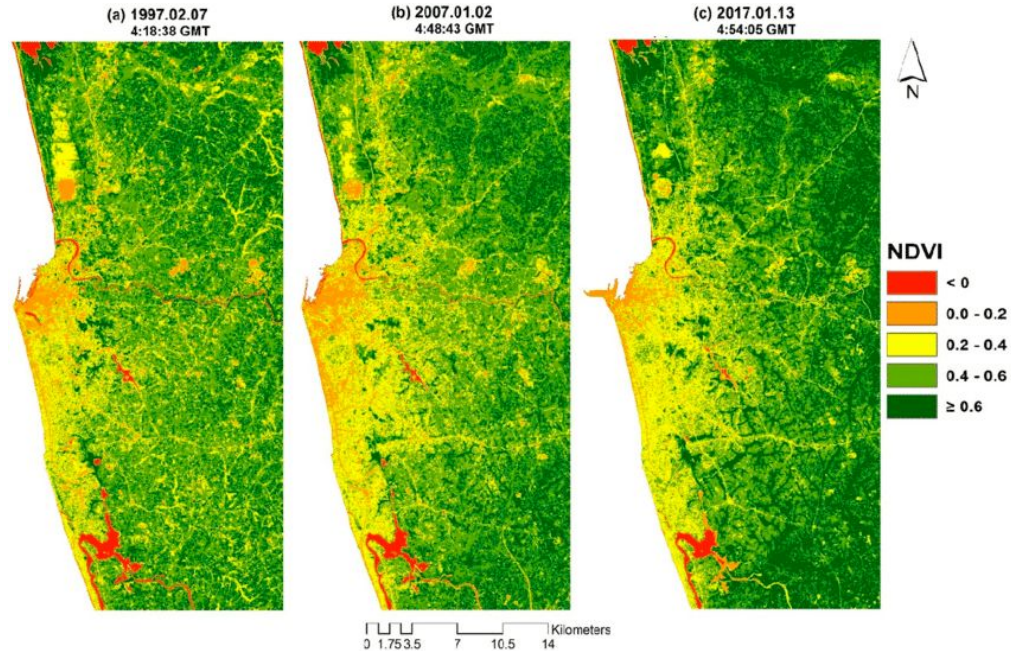
GIS in Emergency Management

- Flood response
 - Modelling river crest height, date, and location based on hydrological measurements
- Damage Assessment
 - Useful for tracking path and severity of tornado damage
- Disaster Response
 - Using GIS to know how to get supplies in and out of an area with damaged road network
 - Evacuation routing
- Wildfire Fighting
 - Predicting where fire may spread



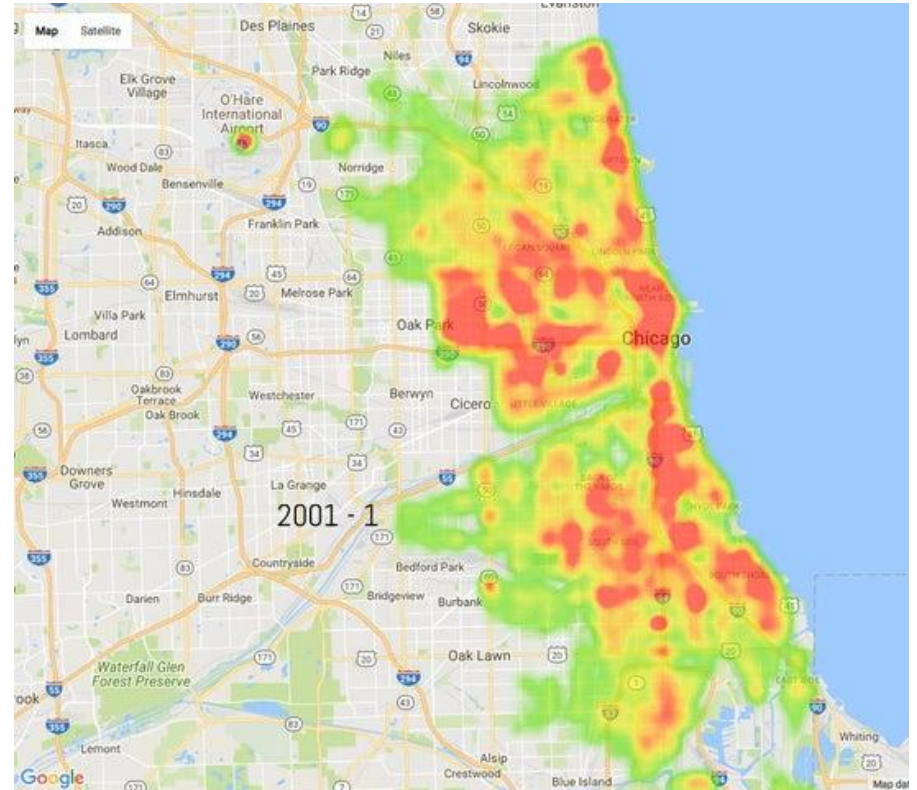
GIS in Biology/Ecology

- Lots of spatial data in biology
 - Locations of individual organisms
 - Habitat Boundaries
 - Biome Boundaries
- Examples of spatial questions
 - Where is habitat loss occurring, and what are its causes?
 - What is the territory of a box turtle?
 - Where can we build a highway that will cause the least damage to an ecosystem?



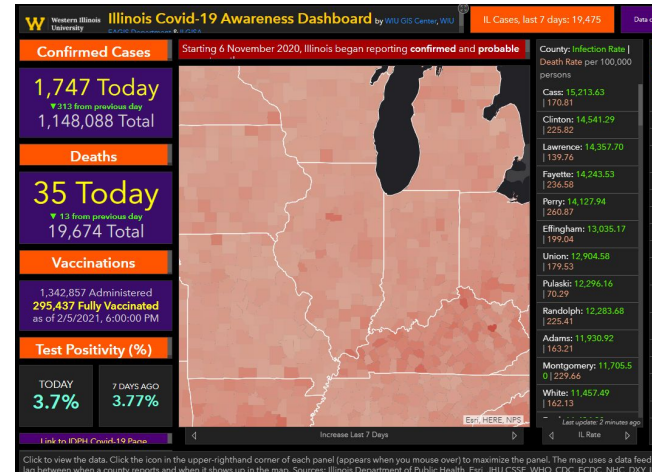
GIS in LEJA

- Crime Mapping
 - Obvious example
- What about 9-1-1 Routing?
 - Old 9-1-1 system was just a list of roads and addresses
 - Better hope the fireman knows where the address is
 - Now, GIS is used to automate routing
 - Combines road, address, ESB layers for better routing
- Community GIS



GIS in Other Disciplines

- GIS in Public Health
 - Where are the COVID-19 hotpots?
 - Can we model where a disease is likely to spread?
- GIS in Business
 - Where is the best place to open a new business?
 - Why are certain business only located bigger cities?
- GIS in Local Government
 - Where should we build a new highway to alleviate traffic?
 - Where should a new bus line go?
 - What is the ideal snow plowing route?



Ok, you get it. GIS is used *everywhere*.

WIU GIS Center

- GIS Partnership between WIU, Macomb, and McDonough County
- Current projects
 - Next Generation 9-1-1
 - Utility database for WIU and Macomb
 - State of Illinois COVID-19 Dashboard
- Notable past projects
 - Taylorville Tornado Mapping
 - Spring 2019 Flood Response
 - Illinois Warming Centers
 - McDonough Co. Health Dept. Web Map
 - Cemetery Mapping
- gis.wiu.edu



Why you should study GIS

- GIS/Geography is a fast-growing industry
- GIS makes you very employable
 - Just knowing GIS is enough to get you certain jobs
- Meteorologists
 - NWS likes for applicants to have some experience with geospatial analysis/GIS
- Biologists
 - Many biology/ecology internships do not even consider applicants without GIS experience
- LEJA
 - Many agencies look for people with GIS experience
- GIS will always boost a resume



Thank you for listening!

Questions?

Making it real - Examples of GIS I've Done

