GIS: MAPPING 101

Mapping Heat Vulnerability in New York City

Columbia Libraries Workshop • Digital Internships Program

PRE-WORKSHOP

- **Ensure all students have ArcGIS Online access via the Columbia GIS Service Center**
  - Software authorization is required before the session begins
  - Check with your department for any additional support or licensing

1. WELCOME + WHAT IS GIS?

Duration: ~10 minutes

Key Topics

- Brief intro: GIS as a tool for making sense of the world's data through mapping
- Four core GIS tasks:
  - Data management – organize and connect datasets
  - Visualization – make patterns visible
  - Spatial analysis – find relationships across space
  - Communication – share results to guide decisions
- Tools overview: ArcGIS Online, ArcGIS StoryMaps, QGIS

Real-World Example

- OpenStreetMap & the World Food Programme's HungerMap Live
  - GIS determines who receives aid, where, and when — making spatial accuracy life-critical
  - Even small mapping errors can cause over- or under-allocation of resources

2. FINDING & UNDERSTANDING DATA

Duration: ~10 minutes

Data Literacy Principles

- **Start with a question, not a dataset**

Example Question	*Where might heat affect people more in NYC?*

Common Data Sources

- Government / Census (ACS)
- Environmental datasets
- Research institutions
- Curated platforms like Living Atlas

Checking Metadata Before Use

- What does this data measure?
- When was it collected?
- What geographic scale is it at?

GIS Data Types

- **Vector Data → Discrete Features (points, lines, polygons)**
  - Examples: census tracts, buildings, cooling centers
  - Best for: boundaries, people, infrastructure
- **Raster Data → Continuous Surfaces (gridded pixels)**
  - Examples: land surface temperature, elevation
  - Best for: environmental patterns, elevation, flood risk

Bonus: Imagery Example

- Drone imagery from Lamont/Columbia using the DJI Mavic 3T
  - Demonstrates real-world thermal and visual raster data collection

3. TODAY'S MAPPING PROJECT

Duration: ~30 minutes

Goal: Explore Heat Vulnerability in NYC

- Map Layer 1: Heat exposure
- Map Layer 2: Vulnerable populations (demographic data)
- Map Layer 3: Cooling center locations
  - Optional — add if time permits

ArcGIS Online Mapping Workflow

#	Step	Description
Step 1	**Choose a basemap**	Provides the background context for your map.
Step 2	**Add layers**	Operational layers — the core reason you're making the map.

Step 3	**Apply styles**	Cartographic tools to visualize features in each layer.
Step 4	**Configure pop-ups**	Display attribute information in an interactive way.
Step 5	**Save & share**	Make the map available to others for use or collaboration.

Decision Prompt

Discuss	*Where would you prioritize cooling interventions in NYC, and why?*

4. MINI REFLECTION

Duration: ~5 minutes

Discussion Questions

- Where do you see the highest combined heat and vulnerability risk?
- What does this map not show? What is missing?
- What new questions does this spatial data raise?

Encourage students to think like GIS practitioners — critically, not just technically.

5. STORYMAPS

Duration: ~15–20 minutes (time permitting)

Steps

- Start a new StoryMap and add a title and cover image
- Embed the web map built in Activity 3
- Add 2–3 short narrative sections to contextualize the map
- Publish and share with the group

Goal: Students leave feeling empowered to tell a spatial story, not just make a map.

LEARNING OUTCOMES

By the end of this workshop, students will be able to:

1	Choose and evaluate data in ArcGIS Online

2	Compare heat and demographic layers
3	Interpret spatial patterns across NYC neighborhoods
4	Publish and share a web map
5	Build a basic StoryMap narrative

RESOURCES

Esri Training & Documentation

- Training and Tutorials: esri.com/training
- Documentation and Help: doc.arcgis.com

Columbia GIS Support

- CIESIN GIS Service Center: ciesin.columbia.edu/gisservicecenter
- Consultations and guidance for coursework and research

Columbia Libraries GIS Guides

- GIS Data Sources: guides.library.columbia.edu/GIS
- ArcGIS / ESRI Tools Guide: guides.library.columbia.edu/geotools/ESRI