



# Data Mining and Analysis in ArcGIS Online

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# Goals for this workshop

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1. **Understanding how to use data portals and to use ArcGIS Online for data mining.**
2. **Loading data into ArcGIS Online.**
3. **Analyzing data for solving problems in ArcGIS Online.**

# Finding and Using Spatial Data

## Old Paradigm

--Download data → Unzip → Format → Project → Tabular Manipulation → Use.

## New Paradigm

--Access data in cloud → Use.

We are not *quite* to the point of fully using the new paradigm ... yet.

## Thus, best practice today is still the hybrid model:

1. Start with ArcGIS Online to search for data.
2. Search local, state, national, international data depositories and portals.

### Examples:

Local: Boulder County CO, Los Angeles County CA

State: [www.tnris.org](http://www.tnris.org) (Texas), CASIL (California), RIGIS (RI)

National: USGS, NASA, Census Bureau, NOAA, EPA, US DOT, USFWS, BLM, USFS, FAA, National Atlas, LINZ (New Zealand), IBGE (Brazil), OS (UK)

International: WRI, WWF, UNEP, World Bank, Natural Earth Data

# What kinds of data can you add to ArcGIS Online?

Data Type	Open in ArcGIS Online	Open in ArcGIS Desktop
Map Notes	X	
Tables (CSV)	X	X
Zipped Shapefiles	X	X Unzip first
Zipped other data	X after unzipping and serving	X after unzipping
Images (JPG, PNG, TIF)	X	X
Feature services	X	X
Layer package, map package		X

# Data Types and Sources

- 1) **Vector:** Shapefiles, geodatabases, feature services, other vector formats.
- 2) **Raster:** ArcGrids, GeoTiffs and other images, Tiled image services.
- 3) **Tabular:** Excel tables, CSVs, TXT files, other formats.
- 4) **Ground images:** Wikipedia and other creative commons sources.

# Data Sources and Issues (privacy, crowdsourcing, cloud vs. desktop, copyright, and how to use).

- *The GIS Guide to Public Domain Data*, by Joseph Kerski and Jill Clark, Esri Press
- <http://spatialreserves.wordpress.com>



The image is a screenshot of the 'Spatial Reserves' website. The page title is 'Spatial Reserves' with the subtitle 'A guide to public domain spatial data'. The navigation menu includes 'Home', 'About the book', 'About the authors', 'Exercises and data for the book', and 'Related sites'. The main content area is titled 'Listing of Free GIS Data Sources from Robin Wilson' and includes a date of 'November 10, 2013' and the author 'josephkerski'. The text discusses the history of spatial data sources and the utility of the resource. A sidebar on the right contains sections for 'Contributors', 'Recent Posts', and 'Recent Comments'. The 'Recent Posts' section lists several articles, including 'The secret lives of phones: someone, somewhere knows where you are' and 'Digital Preservation and Formats from the US Library of Congress'. The 'Recent Comments' section shows a comment from 'Bhojaraju Gunjal'.

# 10 Analytical Exercises in Public Domain Data Book

## Exercises for GIS Guide to Public Domain Data book

These 10 exercises for the GIS Guide to Public Domain Data book build skills in discovering, assessing, formatting, and using spatial data in a GIS environment, as well as analysis to make real-world decisions with those data. For more information, see <http://spatialreserves.wordpress.com>

Switch to  
builder mode

A story map



### Exercise 3

Siting a fire tower  
in Loess Hills,  
Nebraska



Exercise 3: Siting a  
fire tower in the  
Loess Hills of  
Nebraska, USA

In Exercise 3, you determine the optimal site for a fire tower in the Loess Hills of Nebraska, USA, by examining elevation, slope, aspect, land cover, and distance to streams using data from the USGS and a data conversion program. *The GIS Guide to Public Domain Data*



Exercise 1: Assessing the impacts of potential



Exercise 2: Siting a high-speed Internet cafe in



Exercise 3: Siting a fire tower in the Loess Hills



Exercise 4: Analyzing floods and floodplains



Exercise 5: Assessing potential hurricane



Exercise 6: Analyzing land use and



Exercise 7: Creating a map for an ecotourism



Exercise 8: Citizen Science invasive species



## ◆ Finding and using data on ArcGIS Online

--Often helpful to narrow the search, such as:  
quotes “riparian zones”

--Keywords:

<search string> owner:jjkerski or tags: “bike  
lanes”

--Use Boolean operators:

“recent fires” OR fires

owner:esri AND tags:streets

--search in your specific map extent or in your  
organization

More tips on: Using Search – Fields:

<http://resources.arcgis.com/en/help/arcgisonline/index.html#/010q0000000n000000>

## ◆ Accessing and using data portals

# Access Boulder County GIS Portal

The screenshot shows the Boulder County GIS Portal. The browser address bar displays [www.bouldercounty.org/gov/data/pages/gisdldata.aspx](http://www.bouldercounty.org/gov/data/pages/gisdldata.aspx). The page header includes the Boulder County logo and navigation links: 2013 Flood | Home | Contact | Departments | Government | Elections | Jobs & Volunteer. A navigation bar contains links for Families & Adults, Open Space & Recreation, Property & Land, Roads & Transportation, Environment, Safety & Law, and Licenses, Permits & Records. A left sidebar lists various government categories, with 'Maps & Data' expanded to show 'GIS Downloadable Data'. The main content area is titled 'Geographic Information Systems (GIS) Downloadable Data' and includes instructions on how to access the data using ArcGIS Explorer or Google Earth. Below this is a table of downloadable files.

	Metadata (HTM)	Google Earth (KMZ)	ESRI Layer Package (LPK)	ESRI Shapefiles (ZIP)
<b>Buildings</b>				
Building Footprints	<a href="#">HTM (13 KB)</a>	<a href="#">KMZ (6.5 MB)</a>	<a href="#">LPK (3.2 MB)</a>	<a href="#">ZIP (4.6 MB)</a>
<b>Comprehensive Plan</b>				
Archaeologically Sensitive Areas	<a href="#">HTM (16 KB)</a>	<a href="#">KMZ (50 KB)</a>	<a href="#">LPK (340 KB)</a>	<a href="#">ZIP (78 KB)</a>
Environmental Conservation Areas	<a href="#">HTM (53 KB)</a>	<a href="#">KMZ (176 KB)</a>	<a href="#">LPK (285 KB)</a>	<a href="#">ZIP (557 KB)</a>
Geological Hazards	<a href="#">HTM (15 KB)</a>	<a href="#">KMZ (699 KB)</a>	<a href="#">LPK (1.0 MB)</a>	<a href="#">ZIP (706 KB)</a>
Mineral Resource Areas	<a href="#">HTM (15 KB)</a>	<a href="#">KMZ (64 KB)</a>	<a href="#">LPK (134 KB)</a>	<a href="#">ZIP (66 KB)</a>
Natural Communities, Rare Plants, Riparian Corridors, Critical Wildlife Habitat	<a href="#">HTM (519 KB)</a>	<a href="#">KMZ (130 KB)</a>	<a href="#">LPK (203 KB)</a>	<a href="#">ZIP (261 KB)</a>
Significant Agricultural Land	<a href="#">HTM (17 KB)</a>	<a href="#">KMZ (150 KB)</a>	<a href="#">LPK (409 KB)</a>	<a href="#">ZIP (151 KB)</a>

At the bottom of the browser window, a download bar shows 'Floodplain (1).zip' and a 'Show all downloads...' button.

# Save data sets locally, Add to ArcGIS Online via “My Content”

The screenshot shows the ArcGIS Online 'My Content' interface. A modal dialog box titled 'Add Item' is open in the center. The dialog contains the following fields and options:

- Add Item** (Title)
- Add an item from your computer or reference an item on the Web.** (Instruction)
- The item is:** On my computer (Dropdown menu)
- File:** Choose File Floodplain.zip
- Supported Items** (Link)
- Contents:** Shapefile (Dropdown menu)
- Publish this file as a feature service**  
(Adds a feature service item with the same name.)
- Title:** Floodplain
- Tags:** Boulder x County x floodplains x  
Add tag(s)
- Buttons:** ADD ITEM, CANCEL

The background shows a list of content items with columns for Title, Type, Modified, and Shared. A file named 'Floodplain (1).zip' is visible in the bottom left corner of the interface.

# Uploading Your Data into ArcGIS Online

- ◆ **Why upload?** For data that you have either created (Joseph's ocean currents example) or obtained and it is not already on ArcGIS Online {OR} you wish to have more control over the data (Joseph's tornado example.)
- ◆ **You can publish data to ArcGIS Online from ArcGIS Server, from within ArcGIS Desktop, or directly from "My Content" in ArcGIS Online.**

# Using ArcGIS Online Analytical Tools

- ◆ **ArcGIS Online is a cloud-based GIS, not just an online set of web maps. Hence, you can use it for conducting spatial analysis.**
- ◆ **The spatial analysis capabilities of ArcGIS Desktop still far exceed that of ArcGIS Online, given its 30 year head start, but more analytical capabilities are being added quarterly to ArcGIS Online.**
- ◆ **The spatial analytical tools in ArcGIS Online are easy to use. They are accessed from the arrows to the right of specific layers. Whether you see the analytical tools depends on (1) if you are using an ArcGIS Online organizational subscription, and (2) how the data are served in ArcGIS Online (i.e. ideally, as services)**

# Live Demo

## ◆ Using Analytical capabilities in ArcGIS Online

◆ **Problem Statement:** Because of recent devastating floods that occurred in September 2013, the Boulder County Office of Emergency Preparedness, hearing of your excellent GIS skills, has asked you to prepare an assessment of the most vulnerable lands in the county to future flooding and the people on those lands.

You will consider floodplains, geologic hazards, land cover, soils, and demographics in your assessment.

# Analysis Workflow

- ◆ 1. Filter Floodplains layer to only consider the true floodplains. Filter geologic hazards layer to only consider Major Hazards.
- ◆ 2. Proximity → Buffer floodplains by 200 meters.
- ◆ 3. Dissolve the buffer's internal polygons.
- ◆ 4. Manage Data → Overlay → Intersect the dissolved floodplain buffers with Major Geologic Hazards.
- ◆ 5. Sort on Analysis Area and only consider the largest polygons.
- ◆ 6. Data Enrichment, with Tapestry, Landcover, and Soils. Sort on % wetlands and Top 1 Median Age.

# Analysis Results

HOME ▾ Boulder County Colorado Floodplain Analysis Map NEW MAP Joseph ▾

Details Add ▾ Basemap Save ▾ Share Print Directions Measure Bookmarks Find address or place 🔍

**Contents**

- Enriched Intersect of Dissolved 200m Floodplain Buffers Major Geol Hazards - EnrichedLayer
- Intersect of Dissolved 200m Floodplain Buffers with Major Geologic Hazards Boulder County CO USA - OverlayOutput
- Dissolve Floodplain 200m Buffers - DissolvedFeatures
- Buffer of Boulder County Colorado Floodplains - Floodplain - BufferedFeatures
- Geologic Hazards of Boulder County Colorado - Geologic Hazard Corridor
- Geologic Hazards of Boulder County Colorado - Geological Hazard Area
- Natural Communities Riparian Habitats, Boulder County Colorado - CriticalWildlifeHabitats
- Natural Communities Riparian Habitats, Boulder County Colorado - RarePlantAreas
- Natural Communities Riparian Habitats, Boulder County

**Enriched Intersect of Dissolved 200m Floodplain Buffers Major Geol Haz... (27 features, 0 selected)** Table Options ▾ ✕

Top 1 Code	Top 1 Name	Top 1 Value	Top 1 Percentage	Top 1 Type	Top 1 Median Age	Top 1 Income	Top 1 Employment	Top 1 Education	Top 1 Residential	Top 2 Code
2.00	Metropolitans	20.00	100.00	Singles / Shared	37.60	Middle	Professional / Mgmt.	Some College / Bachelor Degree / Graduate Degree	Single Family / Multi-Units	1.00

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# Next Steps

◆ **How to teach with the ArcGIS Platform. Includes video on spatial analysis tools:**

**<http://www.esri.com/landing-pages/industries/education/higher-education/teach-with-arcgis-platform>**

◆ **Deeper Dive with ArcGIS Online:  
See playlist of videos on:**

**<http://www.youtube.com/geographyuberalles>**



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