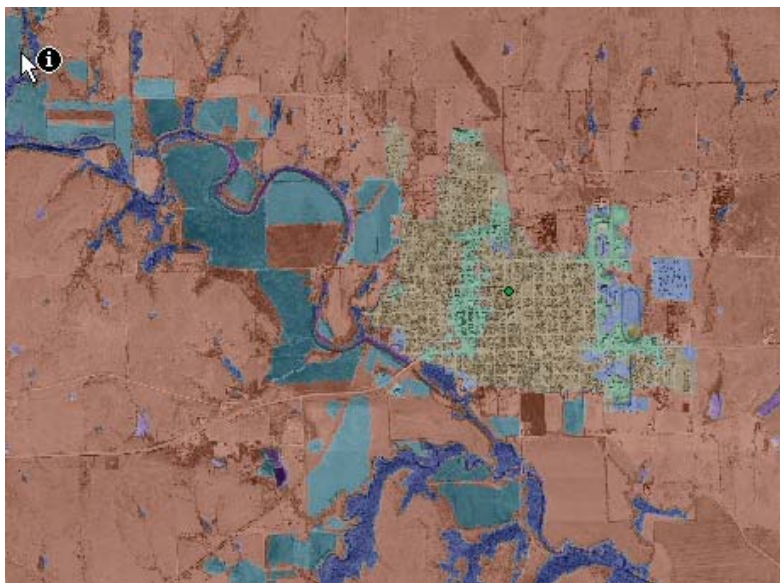


GIS I: Finding GIS Data on the Web

Fall 2006 Workshop



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Academic Data Research Services Alliance (ADRSA) and

KU Libraries Instructional Services

www.ku.edu/~adrsa/

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Introduction

This is an introductory level, instructor-led workshop. This hands-on session will show you some good sites for freely available spatial data, tips on digging for data, and how to download and convert various file types. The Web is a treasure trove of freely available data. ALL you have to do is find it, download (or access) it, and get it into a usable format. This workshop will be helpful for anyone using GIS data or beginning a GIS project, and especially for those using data from different sources.

Prerequisites

[GIS I: ArcMap Introduction](#) or equivalent experience

Objectives

- Identify key factors in looking for and getting data, such as scale, scope of project, quality of data, etc.
- Become familiar with strategies for finding data and a few good download sites
- Become familiar with file formats frequently encountered when downloading data
- Use and download data from an online interactive map and ftp site
- Learn about common compression formats and conversion methods for spatial data
- Learn how to find and read metadata
- Use ArcCatalog to access metadata and preview data
- Connect to data via the Web in ArcMap, using an internet mapping service
- Define the geographic projection for a dataset

- Learn about the structure of common vector and raster formats, such as TIFFs, shapefiles, and coverages
- Become familiar with land cover and land use data

Definitions

Term	Definition
arc interchange file	file with .e00 extension often used to compress ArcInfo coverages for transfer via the web or other means; ArcGIS converts .e00 files (fixed-length ASCII format) to coverages.
coverage	vector data format that is native to ArcInfo; a coverage stores geographic features as primary features (arcs, nodes, polygons, etc.) and secondary features (tics, map extent, etc.) (www.esri.com).
grid	raster data format in which features are represented by cells (or pixels) with same value and cells are organized in a grid of rows and columns; raster format is appropriate for data that vary continuously over space such as elevation; images and grids are types of raster data.
metadata	information describing data such as date created, projection, scale, etc.; often formatted according to standards such as FGDC; available in various formats such as web pages, text files, embedded in data file, etc.
projection	map projections describe ways to represent areas on the Earth's surface (three-dimensional) on a flat surface such as a map; imagine trying to wrap a piece of paper around a globe; all projections distort shape, area, distance or direction to some extent.
raster	type of spatial data in which features are represented by cells (or pixels) with same value and cells are organized in a grid of rows and columns; raster format is appropriate for data that vary continuously over space such as elevation; images and grids are types of raster data.
shapefile	vector data format that stores geographic features and their attributes; geographic features can be represented by points, lines, or polygons (areas) (www.esri.com).
vector	type of spatial data in which features are represented by points, lines or polygons; coordinate-based structure (XY or latitude-longitude) commonly used to represent linear features; coverages and shapefiles are types of vector data.

Acronyms

DEM- Digital Elevation Model, or elevation data, or elevation grid

DOQQ- Digital Orthophoto Quarter Quadrangles, or orthophotos, orthos or air photos

DRG- Digital Raster Graphics, or topographic map, or topos

IMS- Internet Mapping Service

UTM- Universal Transverse Mercator

Strategies for finding spatial data

First check with logical data sources (original or official providers), i.e. for census data go to the Census Bureau, for local data such as air photos and parcels, go to city or county government.

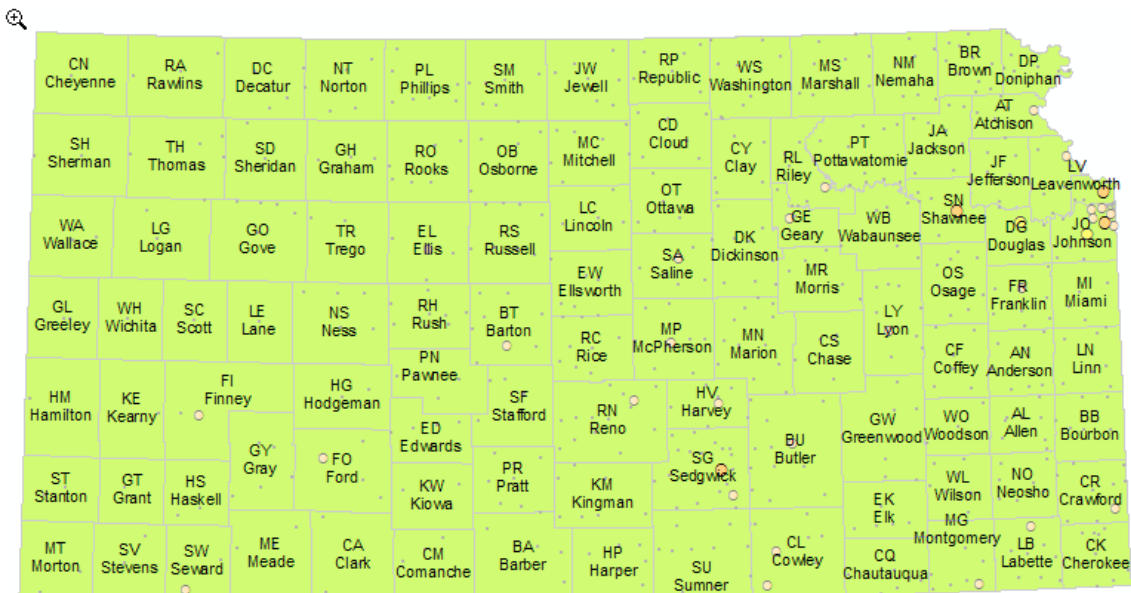
In addition, try searching down this list:

- o **Campus/ Library sites**
 - o ADRSA data links: www2.ku.edu/~adrsa/data.shtml
 - o Library holdings data: www2.ku.edu/~adrsa/data.shtml#library
 - o ESRI Data and Maps (hundreds of data layers that accompany ArcGIS):
http://gis.lib.ku.edu/esri_data_maps.shtml
- o **Local or state government sites**, i.e. KS Data Access and Support Center (state GIS clearinghouse): <http://maps.kansasgis.org/kgcc/catalog/catalog.cfm>
- o **Federal government sites**, i.e. US Geological Survey land cover data links:
<http://landcover.usgs.gov/landcoverdata.php#na>
- o **Non-profit sites**, i.e. MapDex (database of more than 35,000 internet map services containing over 600,000 GIS layers): www.mapdex.org/search/
- o **Commercial sites**, i.e. Geography Network (numerous datasets available through internet mapping services): www.geographynetwork.com

HANDS-ON EXERCISE: LAND COVER MAPPING

Pick Your County

- o Pick a county in Kansas; you will find and work with data for this county (see map pg. 5).
- o We will look at how land is used and classified in Kansas, by working with land use and land cover data. These datasets typically include vegetation types, developed vs. undeveloped areas, forested vs. non-forested areas, etc.
- o We will also find some basemap data, such as orthophotos and locations of cities.

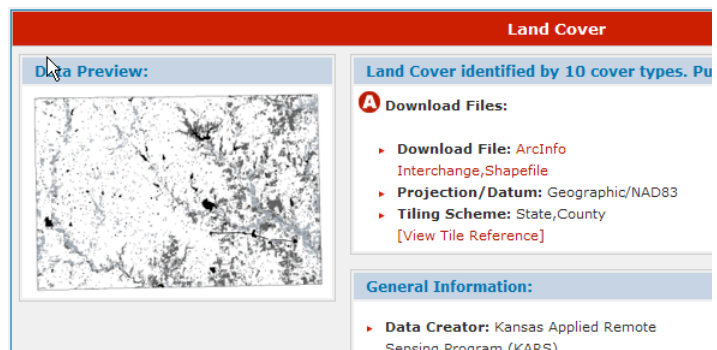


Find data for locations of cities

- o Go to the ESRI Data and Maps download page: http://gis.lib.ku.edu/esri_data_maps.shtml
- o Click on the 'Download Data for...United States' link (notice the links for metadata)
- o Scroll to 'U.S. Populated Places (Points)'
- o Click on this link to open the zipped file
- o Save (extract) the resulting files to **c:\wutemp**
- o Click on Start Menu → Programs → ArcGIS → **ArcCatalog**
- o In ArcCatalog, navigate to layer so it shows on left side
- o Click 'Preview' tab on the right to ensure download worked

Find land use/ cover data (KARS)

- o Go to the DASC site: <http://www.kansasgis.org/catalog/catalog.cfm>
- o Choose the 'Land Surface Geology Soils' category
- o Choose 'Land Cover'
- o Read over the metadata:
 - o *What is the format?*
 - o *How are the data organized (tiled)?*
 - o *What is the projection?*
- o Click on 'ArcInfo Interchange,Shapefile' to start download
- o Click on your county to open the zipped file
- o Save (extract) the resulting files to **c:\wutemp**



Convert EOO file to coverage

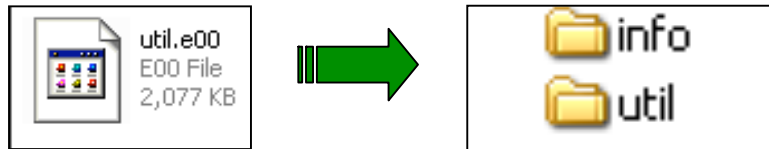


- o Click on the red toolbox to open ArcToolbox (or select under the Window menu)

- o Click on Coverage Tools → Conversion → To Coverage → **Import from Interchange File**

Note, in standalone versions of ArcGIS, you can access this tool from ArcCatalog by right-clicking in the gray area of the menu and choose 'ArcView 8.x Tools'

- o For the input file: navigate to **c:\wutemp** and choose the **.e00 file** (compressed ArcInfo coverage for county land cover)
- o Save the output file in **c:\wutemp** as landcov10
- o Click OK




- o In ArcCatalog, navigate to layer so it shows on left side
- o Click 'Preview' tab on the right to ensure download worked

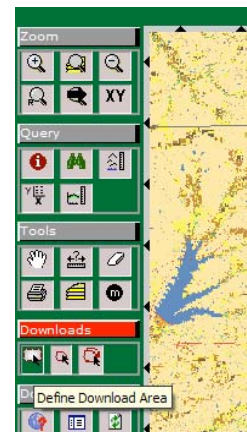
Find more land use/ cover data (USGS)


The U.S. Geological Survey provides the National Land Cover Dataset (NLCD). Download NLCD data for your county, via an interactive map using the instructions below. Note, you can find the NLCD for the entire state, as one large TIFF via FTP download:

<http://edcftp.cr.usgs.gov/pub/data/landcover/states/>.

- o Go to the USGS interactive mapper site: <http://gisdata.usgs.net/website/MRLC/viewer.php>

- o Click the 'Zoom to Region or Area' tool  under Zoom, and select Kansas at bottom
- o On the 'Display' tab at right, click on 'Boundaries' and turn on the counties layer, to find your county
- o Click on the 'Download' tab
- o Click on 'Land Cover' and make sure **NLCD 1992 Land Cover** is checked



- o Under 'Downloads' at left, click on the 'Define Download Area' tool 
- o Click and drag a box around your county; if needed, use the county map at the beginning of this handout to find your county
- o Click on the 'Download' button
- o Open the zipped file
- o Save (extract) the resulting files to **c:\wutemp** (note the file names and that there IS a metadata file)
- o Navigate to layer in ArcCatalog (list on the left) and click 'Preview' tab on the right to ensure download worked
- o Click on Start Menu → Programs → ArcGIS → **ArcMap**
- o Drag layer into ArcMap

Bring in data


- Click on the 'Add Data' button  to bring data layers into ArcMap
- Navigate to: **c:\wutemp**


- Hold down the Control (Ctrl) key and click on the **places.sdc** and **landcov10** layers (highlight) to add all at once

Change how places/ cities display


- Turn on only this layer
- Right-click on this layer title in table of contents, and choose 'Zoom to Layer' (note the area covered by data)
- Right-click on layer title and choose 'Open Attribute Table'
- Examine table to ascertain what field we can use to display only cities in KS
- Close the table
- Set display properties so only cities in KS show (hide all other cities in U.S.): Right-click on layer title and choose 'Layer Properties'
- Click on the 'Definition Query' tab and then on the 'Query Builder' button to build an equation that **displays only** cities in KS (in both view and table)
 - **Double-click** on field name (ST) and **Single-click** on operator (=)
 - Click 'Get Unique Values' button to display all possible field values (state abbreviations)
 - **Double-click** on field value (KS) or type in 'KS' to complete the equation: "ST" = 'KS'
 - Click OK



- On the 'Symbology' tab, click on the point  and change symbol color, size, etc.
- Click OK

- Click on the 'Zoom In' tool  then click and drag a box around the cluster of points representing cities in KS

Use the 'Previous Extent' button  to return to the last zoom

- Click on Identify tool , then on a city to get tabular information such as city name

Add base map (orthophotos) using IMS

- Go to the KS GIS clearinghouse (DASC): <http://www.kansasgis.org/catalog/catalog.cfm>
- Choose the 'Imagery and Raster' category, and notice the numerous types of raster data available, including DRGs, DOQQs and satellite imagery
- Choose the 'MrSID Compressed Digital Orthophoto Counties 2002' and look over the information (metadata) provided:
 - *What year was the imagery collected?*
 - *What format is it in?*

- o *What is the projection?*

Notice you can 'Connect to a Web Service,' or internet mapping service (IMS). An IMS allows you to use data via the web, instead of downloading and using from your computer. An IMS is suitable if you mainly need to display data, and not process or manipulate it. Depending on numerous factors, including website architecture, your system and software setup, size of dataset, etc., an IMS may perform too slow to be useful.

- o Click 'arcims image service' and follow the directions to 'add the service' or connect to the data in ArcCatalog so you can use the data in ArcMap
- o In ArcCatalog's left-hand listing of drives/folders, click on the plus sign to select **GIS Servers**, then select **Add ArcIMS Server**
- o Copy the data server URL (**maps.kansasgis.org**) into the box provided
 - o Open ArcMap: Click on Start Menu → Programs → ArcGIS → **ArcMap**
 - o Expand maps.kansasgis.org and scroll down to the **kgcc_Imagery** map service
 - o Drag it into ArcMap
 - o In ArcMap, expand this layer and check the boxes next to 'kgcc_Imagery' and 'View Aerials 2002'
 - o Hit the Refresh button at bottom (chasing arrows) if imagery does not draw or only partially displays.



Change how orthophotos display

- o Turn all layers on to make sure you can see them at once
- o Turn on only imagery layer (kgcc_Imagery)
- o Zoom out so you can see the entire state aerial layer
- o With the view unprojected, we can see all layers but the shape of Kansas appears distorted
- o Setting a view projection will display the data more accurately, closer to the real shape
- o Choose View → Data Frame Properties
- o On the **Coordinate System** tab, click Predefined → Projected Coordinate Systems → UTM → NAD1983 → **NAD1983 UTM Zone 14N**
- o Click OK and notice **how the shape of Kansas changes**
- o Now turn layers on to see if they all draw (KARS cover does not draw because the file contains no projection information)

Notice that all layers draw except for landcov10 because this file contains no projection information.

- o Remove this layer

Define projection for KARS land cover data

Metadata on the DASC site tells us this dataset is in the Geographic/NAD83 projection, the same as the cities data. However, this projection information was not encoded into the data file itself, so ArcMap does not know the projection in which to draw the data (no geographic 'frame of reference'). For ArcMap to recognize the projection, we must define it using ArcToolbox.

- o Click on the red toolbox to open ArcToolbox (or select under the Window menu)
- o Click on Data Management Tools → Projections and Transformations → **Define Projection**
- o Click on the dropdown arrow under 'Input Dataset...' and choose **landcov10**





- o Click on the Coordinate System icon
- o Click 'Import' and navigate to the location of the cities/places layer (c:\wutemp), to define the projection using that of the cities layer, as they are the same
- o Click OK and OK again
- o Close the define projection window and ArcToolbox when/if it completes successfully
- o Add layer back in
- o Right-click on title to access layer properties, and click on the **Source** tab to see that coordinate system information has now been added

Save Settings and Data as One File

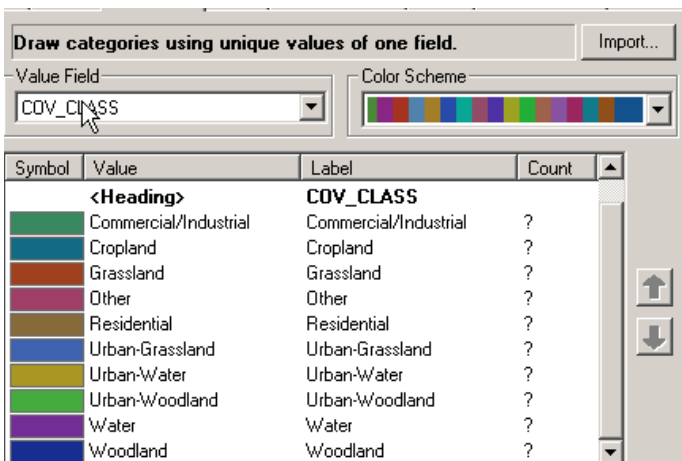
- Choose File → Save As and save map document in **c:\wutemp**

You can save existing data, settings, display schemes, etc. as **ONE** file. Map document files end with .mxd and do not store actual data layers, but references to those layers and settings for data and the data frame. Note that the population table we joined is not permanently attached to the block table. Exporting the block layer as a new shapefile would secure the join, but saving as an MXD will save it temporarily.

- As you work, choose **File → Save** to save changes

Change how KARS land cover data display

- o Right-click on this layer and choose 'Zoom to Layer'
- o Right-click on layer to open attribute table
- o Find the a field (column) that might be useful to show land cover classes
- o Right-click on layer and open layer properties
- On the **Symbology** tab, click on 'Categories' and select 'Unique Values'
- Change the 'Value Field' to '**COV_CLASS**' (land cover class)



- Click on the 'Add All Values' button
- Click on the **Display** tab and set the transparency level at 40 to 60% so the air photos underneath can be seen
- Click OK

Change how NLCD land cover data display

- o Right-click on layer and open layer properties

- o On the **General** tab, type a more descriptive name for the layer, such as **nlcd land cov**
- On the **Symbology** tab, click on 'Unique Values'
- Type in overall class names in the Label column using the metadata below, i.e. for 10s type 'Water,' for 20s type 'Developed,' for 30s type 'Barren,' etc.

Symbol	<VALUE>	Label
	11	Water
	21	Developed
	22	Developed
	23	Developed
	31	Barren
	32	Barren
	33	Barren
	41	Vegetated
	42	42

Class number corresponds to the value column in the attribute table. All classes may not be represented in a specific state data set.

Water

- 11 Open Water
- 12 Perennial Ice/Snow

Developed

- 21 Low Intensity Residential
- 22 High Intensity Residential
- 23 Commercial/Industrial/Transportation

Barren

- 31 Bare Rock/Sand/Clay
- 32 Quarries/Strip Mines/Gravel Pits
- 33 Transitional

Vegetated; Natural Forested Upland

- 41 Deciduous Forest
- 42 Evergreen Forest
- 43 Mixed Forest

Shrubland

- 51 Shrubland

Non-natural Woody

- 61 Orchards/Vineyards/Other

Herbaceous Upland

- 71 Grasslands/Herbaceous

Herbaceous Planted/Cultivated

- 81 Pasture/Hay
- 82 Row Crops
- 83 Small Grains
- 84 Fallow
- 85 Urban/Recreational Grasses

Wetlands

- 91 Woody Wetlands
- 92 Emergent Herbaceous Wetlands

- Click on the **Display** tab and set the transparency level at 40 to 60% so the air photos underneath can be seen
- Click OK

Compare land cover datasets

	No. of classes	Date	Compressed Format	Uncompressed Format	Projection	Resolution
KARS Land Cover	10	1993	.e00 (ArcInfo Interchange)	Coverage	Geographic NAD83	30 m ?
USGS Land Cover (NLCD)	21	1992	.zip	TIFF	Geographic NAD83	30 m

- Choose an area in your county and turn land cover layers off and on to explore how these layers and the orthophotos match (or don't match) up

What are some of the major differences between these 2 land cover datasets?

Do they both classify all water bodies on the orthos, as water?

Note: **Please complete a workshop evaluation.** An online evaluation is linked from the internet browser 'Favorites' menu.

More Information

KU GIS Day is November 15. Get details on the student competition, find a schedule and register at: <http://www.lib.ku.edu/gis/>.

ArcGIS software manuals, or 'ESRI Digital Books' are now available via the Library Web: http://gis.lib.ku.edu/esri_dig_books.shtml.

All workshops offered through Information Services are free to KU students, staff, faculty, and approved affiliates. To learn more about or register for workshops, receive announcements of upcoming workshops, and track workshops you attend, visit the KU Libraries Instruction Web site at www.lib.ku.edu/instruction. You can also check our online schedule at www.ku.edu/acs/schedule for a list of class offerings and availability.

- Upcoming GIS Workshops (<http://www2.ku.edu/~workshops>)
 - o **GIS II: Mapping Your Data**, Oct. 31

Getting Additional Help

Be part of the **KU GIS user community** by joining kugis-l

- o To subscribe to listserv, send email to: listproc@ku.edu
- o In the first line of the **body** of the message enter: **subscribe kugis-l yourfirstname yourlastname**

Online Tutorials- Learn GIS at your own pace through virtual tutorials. ESRI online tutorials are available free to KU-affiliates and can be used by individuals or classes. See a list of courses at: www.kars.ku.edu/user/vc_courses.shtml and email or call (data@ku.edu, mickey@ku.edu or 864-1238, 864-0454) to register for one or more.

GIS and Data Lab, 105 Anschutz Library

Hours (during classes): Mon-Thurs **9AM-8PM**, Fri **9AM-5PM**, Sat/Sun **1PM-5PM**

Contact: data@ku.edu or 864-1238 (Rhonda Houser), 864-7777 (Mickey Waxman)

More information: www.lib.ku.edu/gis

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