

**KANSAS GEOLOGICAL SURVEY
OPEN-FILE REPORT 2003-5**

Preparing of DEM, Soil, and Landuse GIS Data
for Modeling of Kansas Watersheds

by

Xiaoyong Zhan
Girmay Misgna

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Xiaoyong Zhan and Girmay Misgna
Kansas Geological Survey

KGS Open-file Report 2003-05

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Abstract

This report documents the step by step procedure for preparing DEM, soil, and landuse GIS data for modeling of Kansas watershed. The data can be downloaded from the Data Access and Support Center of Kansas (DASC), located at the [Kansas Geological Survey](#). Arc/GIS and ArcView are used to process the data.

1. Introduction

DEM, soil, and landuse data are necessary for modeling of watershed. However, these data are often stored piece by piece. For large watersheds, data processing such as conversions of one data format to another format, merging several datasets, and hand editing have to be done by using GIS tools before organizing GIS data as modeling input format.

This report is prepared to assist data preparation for modeling of watershed. It is illustrative in a step by step format by using Arc/GIS and ArcView. The demonstration is limited to Kansas data source, but the procedure can be applied to other states as far as data source is available.

2. Step-by-step procedure for DEM data preparation

Step 1: Find out where is DASC

DEM data for Kansas can be found from the Data Access and Support Center of Kansas (DASC). DASC is a cooperating member of the [National Spatial Data Infrastructure \(NSDI\)](#). DASC's node contains [Federal Geographic Data Committee \(FGDC\)](#) compliant metadata, FTP access, search capabilities, and metadata submission capabilities. DASC is located at the [Kansas Geological Survey](#)

Here is the link to DASC:
<http://gisdasc.kgs.ku.edu/>

Step 2: Find out the location to download DEM data for Kansas

DEM data is stored in [Kansas GeoDatabase](#) and the link is:
<http://mapster.kgs.ukans.edu/dasc/catalog/coredata.html>
To download DEM, go to Elevation Section.

- **Elevation**
- [Digital Elevation Model \(DEM\) 100K](#)
- [Digital Elevation Model \(DEM\) 24K](#)
- [Digital Elevation Model \(DEM\) 250K](#)
- [Digital Line Graphs \(DLG\) 24K](#)
DLG 24K Hypsography
- [Hypsography 100K](#)
- [National Elevation Dataset \(NED\)](#)

Step 3: Find out which DEM data you want to use

For the watershed modeling, we use [Digital Elevation Model \(DEM\) 24K](#)

The description page for [Digital Elevation Model \(DEM\) 24K](#) shows all technical information as following:

Title: *Digital Elevation Model (DEM) 24K*

Description: 7.5 min. Digital Elevation Model: 30 meter interval.

This dataset is tiled by: 1:24,000 USGS Quadrangle

Projection: Universal Transverse Mercator (UTM); Zones 13-15

Datum: NAD 27

File Format: DEM

Status: This dataset is incomplete. [Status Map](#).

Preview Data : [Available](#)

Download Data: [Available](#)

[Having problems downloading? **Check and see if you have a firewall.** If you are, you must contact **YOUR I.T.** department to fix the problem. If you are still having problems after fixing your firewall, try upgrading your browser, or use an FTP utility such as WS FTP connecting to gisdasc.kgs.ku.edu with username: *anonymous* and password: *your@emailaddress.*]

Additional Data Documentation: [Available](#)

Data isn't how you would like it? Fill out an [On-Line Request Form](#).

Subscribe to databases and be notified of updates/additions to the GeoDatabase using the [DASC GeoDatabase Subscription Form](#).

Metadata Options:

[View FGDC \(html\)](#) | [Download FGDC \(txt\)](#) | [Download Abbreviated \(pdf\)](#)

Index Maps:

Used to determine the quad/county/huc name of your area of interest

- [Interactive Base Map](#)
- Static Maps
 - [County FIPS Codes](#)
 - [1:24,000](#)
 - [1:100,000](#)
 - [1:250,000](#)
 - [County](#)
 - [HUC](#)

Step 4: Find out which counties' DEM data you want to use

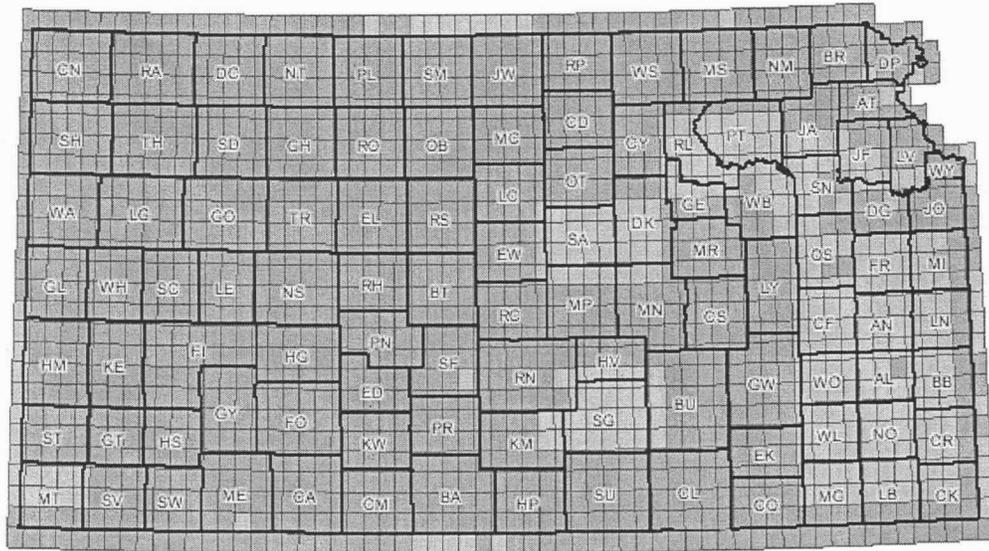
To decide which counties' DEM data, click on Status map in the Data Status Section.

Status: This dataset is incomplete. [Status Map](#).

The following Kansas County Map will show up.

DEM_24K Status Map

Last updated on September 17, 2002



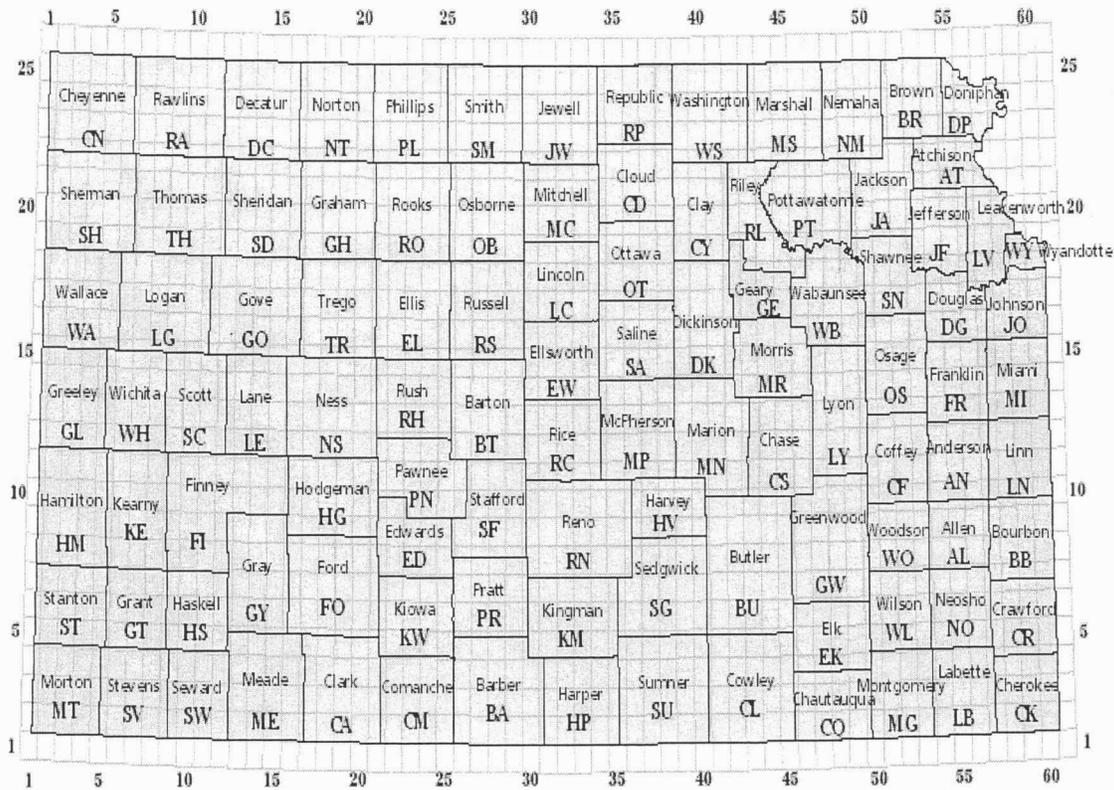
Legend	
Available - Level 1	Available - Level 2

Step 5: Find out the row number then column number of DEM data for the counties you want to use

To find out the row numbers then column numbers from the index map

24K Quadrangle Index Map

click on the county to view the 24K quadrangles in that county. 24K Quadrangles are identified by row/column number. Write down all row and column number you want. One watershed may cross several counties. For example, 2354 for Everest in Brown county and 2254 for Effingham in Atchison county are two pieces DEM we want to download from ftp site.



- County Boundary
- 1:24K Quadrangle Boundary

Select by Name

[Allen](#) | [Anderson](#) | [Atchison](#) | [Barber](#) | [Barton](#) | [Bourbon](#) | [Brown](#) | [Butler](#) | [Chase](#) | [Chautauqua](#) | [Cherokee](#) |
[Cheyenne](#) | [Clark](#) | [Clay](#) | [Cloud](#) | [Coffey](#) | [Comanche](#) | [Cowley](#) | [Crawford](#) | [Decatur](#) | [Dickinson](#) | [Doniphan](#) |
[Douglas](#) | [Edwards](#) | [Elk](#) | [Ellis](#) | [Ellsworth](#) | [Finney](#) | [Ford](#) | [Franklin](#) | [Geary](#) | [Gove](#) | [Graham](#) | [Grant](#) | [Gray](#) |
[Greeley](#) | [Greenwood](#) | [Hamilton](#) | [Harper](#) | [Harvey](#) | [Haskell](#) | [Hodgeman](#) | [Jackson](#) | [Jefferson](#) | [Jewell](#) |
[Johnson](#) | [Kearny](#) | [Kingman](#) | [Kiowa](#) | [Labelle](#) | [Lane](#) | [Leavenworth](#) | [Lincoln](#) | [Linn](#) | [Logan](#) | [Lyon](#) |
[McPherson](#) | [Marion](#) | [Marshall](#) | [Meade](#) | [Miami](#) | [Mitchell](#) | [Montgomery](#) | [Morris](#) | [Morton](#) | [Nemaha](#) | [Neosho](#) |
[Ness](#) | [Norton](#) | [Osage](#) | [Osborne](#) | [Ottawa](#) | [Pawnee](#) | [Phillips](#) | [Pottawatomie](#) | [Pratt](#) | [Rawlins](#) | [Reno](#) |
[Republic](#) | [Rice](#) | [Riley](#) | [Rooks](#) | [Rush](#) | [Russell](#) | [Saline](#) | [Scott](#) | [Sedgwick](#) | [Seward](#) | [Shawnee](#) | [Sheridan](#) |
[Sherman](#) | [Smith](#) | [Stafford](#) | [Stanton](#) | [Stevens](#) | [Sumner](#) | [Thomas](#) | [Trego](#) | [Wabaunsee](#) | [Wallace](#) |
[Washington](#) | [Wichita](#) | [Wilson](#) | [Woodson](#) | [Wyandotte](#) |

Step 6: FTP the DEM data

When you click on DEM ftp site ftp://gisdasc.kgs.ukans.edu/gisdata/dem/dem_24k/, it will display

FTP directory /gisdata/dem/dem_24k/ at gisdasc.kgs.ukans.edu

[Up to higher level directory](#)

06/06/2001 12:00AM

Directory .

07/15/2002 11:42AM

Directory ..

```

06/06/2001 12:00AM          219 .message
08/02/2000 12:00AM      Directory archive
08/02/2000 12:00AM      Directory row01
08/02/2000 12:00AM      Directory row02
08/02/2000 12:00AM      Directory row03
08/02/2000 12:00AM      Directory row04
08/02/2000 12:00AM      Directory row05
08/02/2000 12:00AM      Directory row06
08/02/2000 12:00AM      Directory row07
08/02/2000 12:00AM      Directory row08
08/02/2000 12:00AM      Directory row09
08/02/2000 12:00AM      Directory row10
08/02/2000 12:00AM      Directory row11
08/02/2000 12:00AM      Directory row12
08/02/2000 12:00AM      Directory row13
08/02/2000 12:00AM      Directory row14
08/02/2000 12:00AM      Directory row15
08/02/2000 12:00AM      Directory row16
08/02/2000 12:00AM      Directory row17
08/02/2000 12:00AM      Directory row18
08/02/2000 12:00AM      Directory row19
08/02/2000 12:00AM      Directory row20
08/02/2000 12:00AM      Directory row21
08/02/2000 12:00AM      Directory row22
08/02/2000 12:00AM      Directory row23
08/02/2000 12:00AM      Directory row24
08/02/2000 12:00AM      Directory row25
08/02/2000 12:00AM      Directory row26

```

Because we want 2354 and 2254, click on row23 and row22, respectively. When you click on row23, it will display

FTP directory /gisdata/dem/dem_24k/row23/ at gisdasc.kgs.ukans.edu

```

Up to higher level directory
08/02/2000 12:00AM      Directory .
06/06/2001 12:00AM      Directory ..
08/02/2000 12:00AM      182,972 2301_dem.zip
08/02/2000 12:00AM      194,639 2302_dem.zip
08/02/2000 12:00AM      161,926 2303_dem.zip
08/02/2000 12:00AM      111,296 2304_dem.zip
08/02/2000 12:00AM      108,534 2305_dem.zip
08/02/2000 12:00AM      136,509 2306_dem.zip
08/02/2000 12:00AM      179,039 2307_dem.zip
08/02/2000 12:00AM      188,935 2308_dem.zip
08/02/2000 12:00AM      146,309 2309_dem.zip
08/02/2000 12:00AM      171,302 2310_dem.zip
08/02/2000 12:00AM      178,703 2311_dem.zip
08/02/2000 12:00AM      186,739 2312_dem.zip
08/02/2000 12:00AM      161,827 2313_dem.zip
08/02/2000 12:00AM      161,514 2314_dem.zip
08/02/2000 12:00AM      172,998 2315_dem.zip
08/02/2000 12:00AM      176,518 2316_dem.zip
08/02/2000 12:00AM      188,962 2317_dem.zip
08/02/2000 12:00AM      198,969 2318_dem.zip

```

08/02/2000 12:00AM	198,450	2319_dem.zip
08/02/2000 12:00AM	205,762	2320_dem.zip
08/02/2000 12:00AM	190,721	2321_dem.zip
08/02/2000 12:00AM	189,945	2322_dem.zip
08/02/2000 12:00AM	183,337	2323_dem.zip
08/02/2000 12:00AM	162,300	2324_dem.zip
08/02/2000 12:00AM	162,985	2325_dem.zip
08/02/2000 12:00AM	159,509	2326_dem.zip
08/02/2000 12:00AM	168,564	2327_dem.zip
08/02/2000 12:00AM	165,313	2328_dem.zip
08/02/2000 12:00AM	112,572	2329_dem.zip
08/02/2000 12:00AM	195,382	2330_dem.zip
08/02/2000 12:00AM	183,172	2331_dem.zip
08/02/2000 12:00AM	177,019	2332_dem.zip
08/02/2000 12:00AM	158,085	2333_dem.zip
08/02/2000 12:00AM	149,025	2334_dem.zip
08/02/2000 12:00AM	135,938	2335_dem.zip
08/02/2000 12:00AM	186,060	2336_dem.zip
08/02/2000 12:00AM	172,592	2337_dem.zip
08/02/2000 12:00AM	185,055	2338_dem.zip
08/02/2000 12:00AM	178,009	2339_dem.zip
08/02/2000 12:00AM	181,458	2340_dem.zip
08/02/2000 12:00AM	159,803	2341_dem.zip
08/02/2000 12:00AM	189,462	2342_dem.zip
08/02/2000 12:00AM	198,625	2343_dem.zip
08/02/2000 12:00AM	210,940	2344_dem.zip
08/02/2000 12:00AM	203,885	2345_dem.zip
08/02/2000 12:00AM	189,921	2346_dem.zip
08/02/2000 12:00AM	196,802	2347_dem.zip
08/02/2000 12:00AM	195,208	2348_dem.zip
08/02/2000 12:00AM	195,961	2349_dem.zip
08/02/2000 12:00AM	268,429	2350_dem.zip
08/02/2000 12:00AM	267,031	2351_dem.zip
08/02/2000 12:00AM	254,936	2352_dem.zip
08/02/2000 12:00AM	255,110	2353_dem.zip
08/02/2000 12:00AM	248,853	2354_dem.zip
08/02/2000 12:00AM	124,599	2355_dem.zip
08/02/2000 12:00AM	218,097	2356_dem.zip
08/02/2000 12:00AM	207,021	2357_dem.zip
08/02/2000 12:00AM	82,774	2358_dem.zip
08/02/2000 12:00AM	1,561,010	2359_dem.zip

Click on [2354_dem.zip](#) and save it in the local computer. Do the same thing for [2254](#). You will have two sets of Dem data for different counties.

Step 7: Unzip the DEM data

Unzip the DEM data you downloaded and they will be in different folders named as [2354_dem](#) and [2254_dem](#). Each folder includes one DEM file named [2354.dem](#) and [2254.dem](#), respectively.

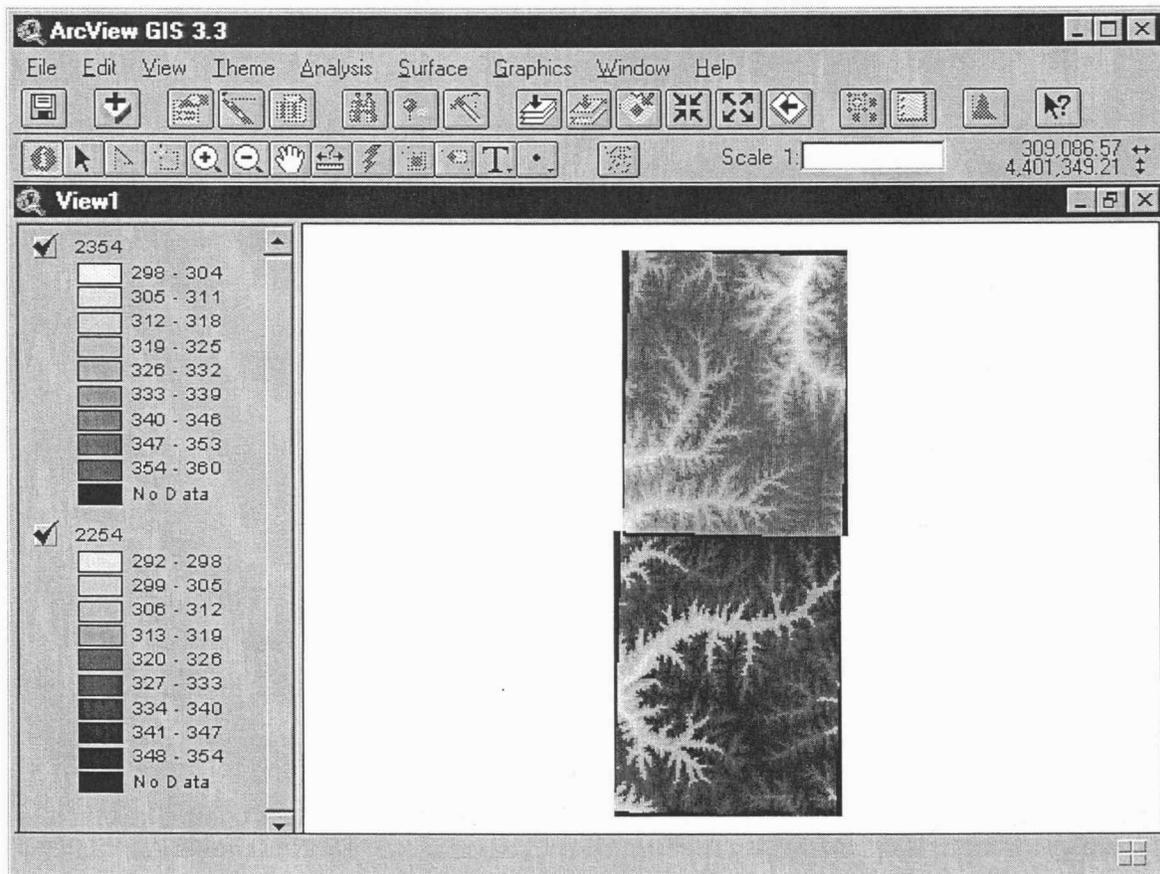
Step 8: View the DEM data

You can use ArcView to view the DEM. For ArcView, click on

Start ->Program->ArcView->OK->No, then
File->Extensions->Geoprocessing->Spatial Analyst->OK.

Import Data Source->USGS DEM->OK, then search for 2354.dem ->OK
Search or define the name 2354 for the grid file->OK-OK-Yes
Do the same thing for 2254.

Click on boxes of 2354 and 2254 in ArcView, then the DEMs will display.

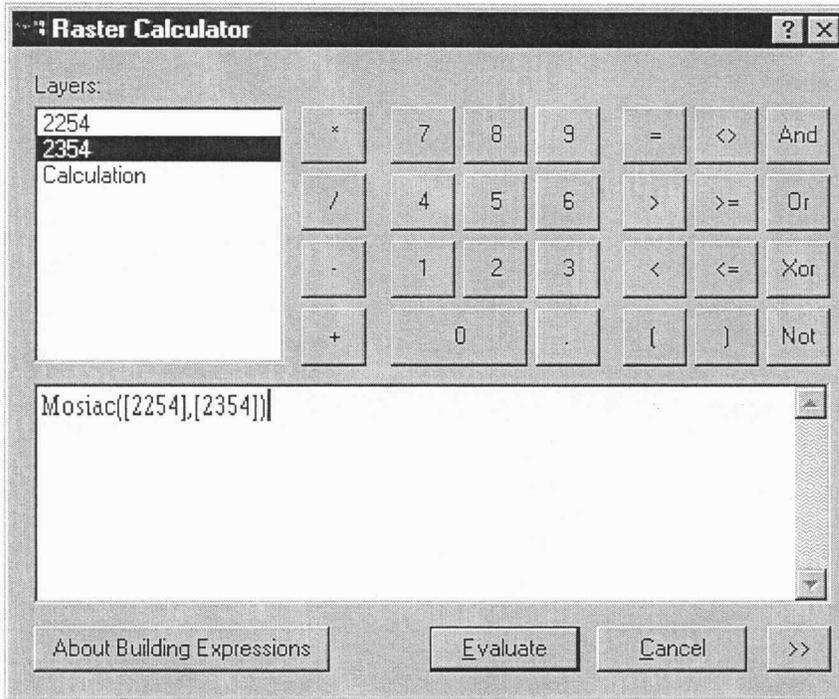


Step 9: Merge the DEM data

Two adjacent DEMs need to be merged into one piece.

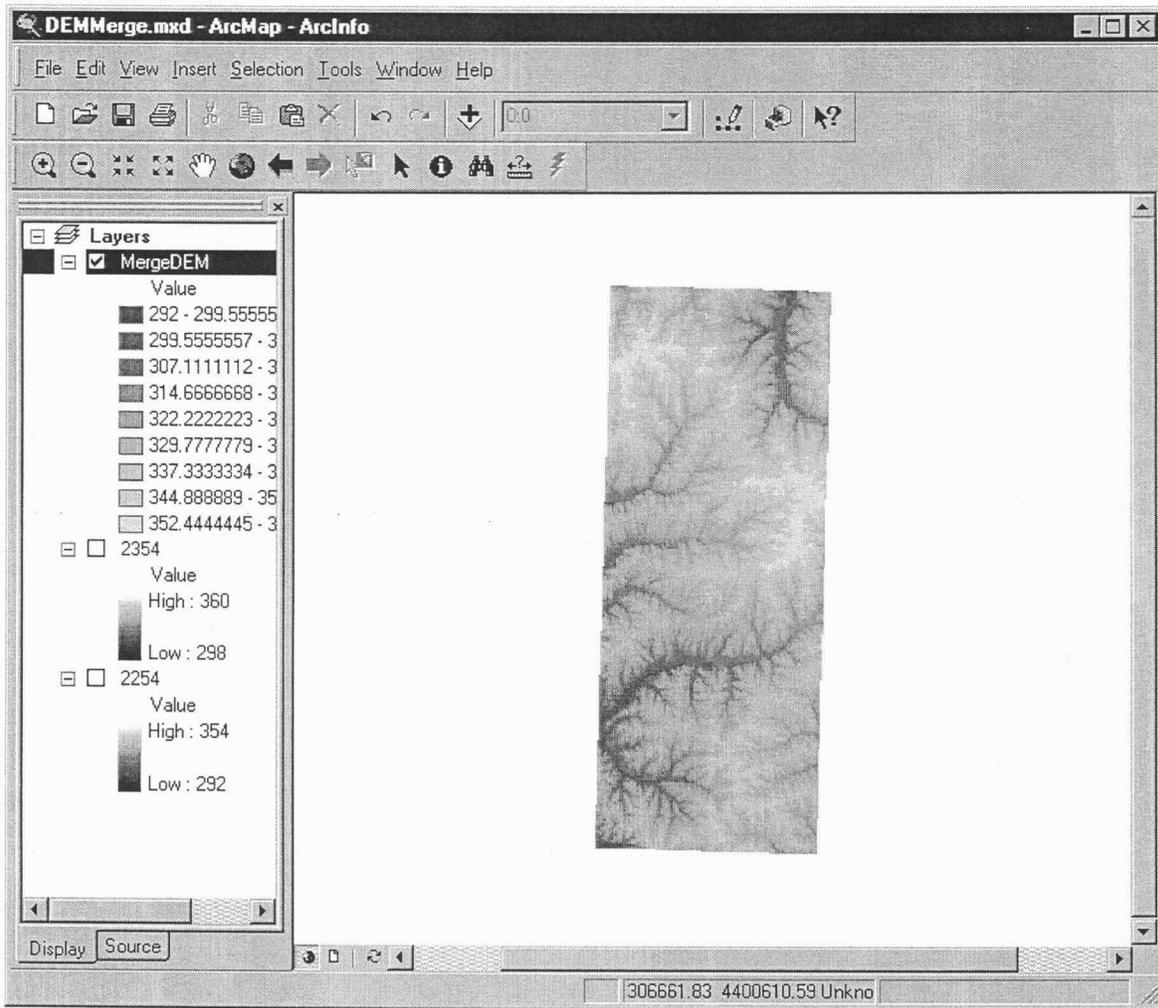
With ArcMap, DEMs can be merged with the merging function. Some DEMs need to be processed before merging because of inconsistencies in projection, datum, and many other factors. To merge these two DEMs, Click Tool->Extensions->Check Spatial Analyst, then Click on Tool->Customize->Check Spatial Analyst to show up the toolbar for Spatial Analyst. Click Spatial Analyst toolbar->Option->Extent->Set Analysis extent Same as Display->OK. Click Spatial Analyst toolbar->Raster Calculator->mosaic([2254],[2354]) to generate the merged DEM, default named Calculation. Click Spatial Analyst toolbar->Raster Calculator->con(isnull([Calculation]),focalmean([Calculation],rectangle,4,4),[Calculation]) to

generate the filled DEM. Right click the filled DEM and make it permanent and remove other unnecessary DEMs. The final merged and filled DEM is shown below.



For ArcView, with the Spatial Tools extension loaded, use the Merge Grids script under the Transformation menu to merge each DEM grid into one mosaic. The spatial tool extension is freely downloadable from http://www.absc.usgs.gov/glba/gistools/#SPATIAL_TOOLS.

Loading this Extension: Spatial Tools is an ArcView program extension which must be run simultaneously with Spatial Analyst. After downloading, unzip the .avx file directly (or unzip to a temp directory, then copy) to the ArcView EXT32 folder. Start the ArcView program, click on "file" and go to "extensions". From the list of available extensions, select Spatial Analyst, then Spatial Tools and click "ok". The collection of new functions will now be available through menu choices, tools, and buttons. When the mosaic is complete, use the Boundary Clean script under the Clean Up menu to remove any "data-less" boundary areas.



3. Step-by-step procedure for Soil data preparation

Step 1: Find out where is DASC

DEM data for Kansas can be found from the Data Access and Support Center of Kansas (DASC). DASC is a cooperating member of the National Spatial Data Infrastructure (NSDI). DASC's node contains Federal Geographic Data Committee (FGDC) compliant metadata, FTP access, search capabilities, and metadata submission capabilities. DASC is located at the Kansas Geological Survey

Here is the link to DASC:

<http://gisdasc.kgs.ku.edu/>

Step 2: Find out the location to download Soil data for Kansas

Soil data is stored in Kansas GeoDatabase and the link is:

<http://mapster.kgs.ukans.edu/dasc/catalog/coredata.html>

To download Soil, go to Land Surface/Geology/Soils Section.

• Land Surface/Geology/Soils

- [Detailed Soils 24K](#)
- [Digital Line Graphs \(DLG\) 24K](#)
DLG 24K Non-vegetative features
DLG 24K Vegetative Surface Cover
- [GAP Analysis Program \(GAP\)](#)
- [Geology](#)
Geology (Lines)
Geology (Polygons)
- [Geology - Surficial 24K](#)
- [Ground-based Statewide Vegetation Survey](#)
- [Land Cover](#)
- [Land Use/Land Cover 250K](#)
- [Riparian Inventory](#)
- [SSURGO](#)
- [STATSGO](#)
- [Soils - Mean Permeability](#)
- [Soils - Potential Runoff](#)
- [Soils Lite](#)

Step 3: Find out which Soil data you want to use

For the watershed modeling, we use mainly SSURGO

The description page for SSURGO shows all technical information as following:

Title: SSURGO

Description: Certified Soil Survey Geographic. Soil survey polygons attributed SCS map symbol (MUSYM, MUID, STSYM). The original 24K Detailed Soils polygon coverages are currently being certified by NRCS Fort Worth. The 24K Detailed Soils polygon coverages will be replaced by the

Certified SSURGO as they are delivered to DASC. See the SSURGO Status Map to determine if your area has been replaced by the Certified SSURGO data.

This dataset is tiled by: 1:24,000 USGS Quadrangle; surveyed by county/multiple counties

Projection: Universal Transverse Mercator (UTM); Zones 13-15

Datum: NAD 27

File Format: ArcInfo Interchange

Status: This dataset is incomplete. [Status Map](#).

Preview Data : [Available](#)

Download Data: [Available](#)

[Having problems downloading? **Check and see if you have a firewall.** If you are, you must contact **YOUR I.T.** department to fix the problem. If you are still having problems after fixing your firewall, try upgrading your browser, or use an FTP utility such as WS FTP connecting to [gisdasc.kgs.ku.edu](ftp://gisdasc.kgs.ku.edu) with username:*anonymous* and password: *your@emailaddress.*]

Additional Data Documentation: [Available](#)

Data isn't how you would like it? Fill out an [On-Line Request Form](#).

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Metadata Options:

[View FGDC \(html\)](#) | [Download FGDC \(txt\)](#) | [Download Abbreviated \(pdf\)](#)

Index Maps:

Used to determine the quad/county/huc name of your area of interest

- [Interactive Base Map](#)
- Static Maps
 - [County FIPS Codes](#)
 - [1:24,000](#)
 - [1:100,000](#)
 - [1:250,000](#)
 - [County](#)
 - [HUC](#)

Step 4: Find out which counties' Soil data you want to use

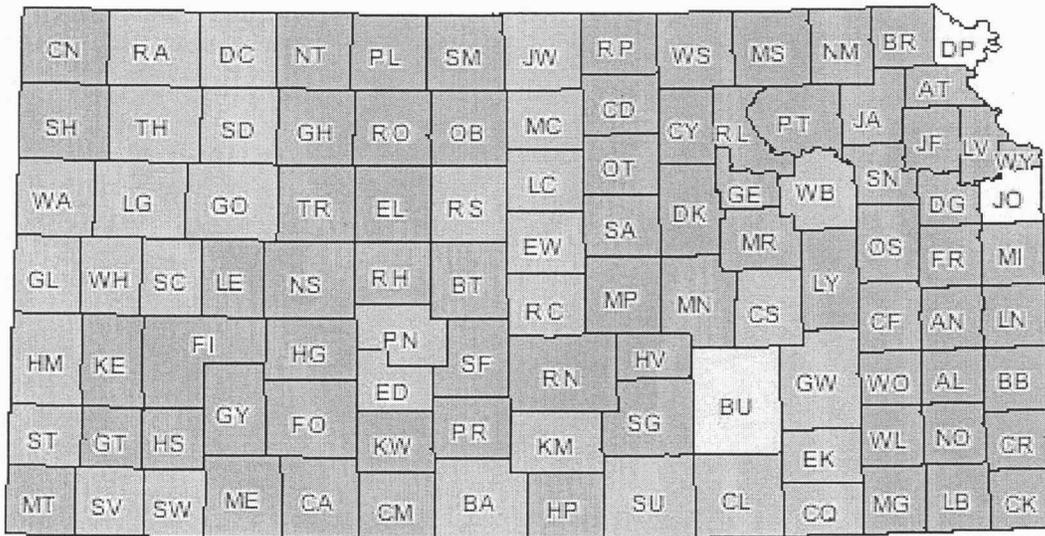
To decide which counties' Soil data and the format of Soil data you want to use, click on Status map in the Data Status Section.

Status: This dataset is incomplete. [Status Map.](#)

The following Kansas County Map will show up.

SSURGO Status Map

Last updated on September 17, 2002



Legend			
Not Available	NAD 27 - Old Attribute Format	NAD 27 - New Attribute Format	NAD 83 - New Attribute Format

Step 5: Find out the FIPS code and county abbr. of Soil data for the counties you want to use

Select the FIPS code and county abbr. from the following [County FIPS Codes](#)

FIPS Code	County Abbr	County Name	FIPS Code	County Abbr	County Name	FIPS Code	County Abbr	County Name
20001	AL	ALLEN	20071	GL	GREELEY	20141	OB	OSBORNE
20003	AN	ANDERSON	20073	GW	GREENWOOD	20143	OT	OTTAWA
20005	AT	ATCHISON	20075	HM	HAMILTON	20145	PN	PAWNEE
20007	BA	BARBER	20077	HP	HARPER	20147	PL	PHILLIPS
20009	BT	BARTON	20079	HV	HARVEY	20149	PT	POTTAWATOMIE
20011	BB	BOURBON	20081	HS	HASKELL	20151	PR	PRATT

20013	BR	BROWN	20083	HG	HODGEMAN	20153	RA	RAWLINS
20015	BU	BUTLER	20085	JA	JACKSON	20155	RN	RENO
20017	CS	CHASE	20087	JF	JEFFERSON	20157	RP	REPUBLIC
20019	CQ	CHAUTAUQUA	20089	JW	JEWELL	20159	RC	RICE
20021	CK	CHEROKEE	20091	JO	JOHNSON	20161	RL	RILEY
20023	CN	CHEYENNE	20093	KE	KEARNY	20163	RO	ROOKS
20025	CA	CLARK	20095	KM	KINGMAN	20165	RH	RUSH
20027	CY	CLAY	20097	KW	KIOWA	20167	RS	RUSSELL
20029	CD	CLOUD	20099	LB	LABETTE	20169	SA	SALINE
20031	CF	COFFEY	20101	LE	LANE	20171	SC	SCOTT
20033	CM	COMANCHE	20103	LV	LEAVENWORTH	20173	SG	SEDGWICK
20035	CL	COWLEY	20105	LC	LINCOLN	20175	SW	SEWARD
20037	CR	CRAWFORD	20107	LN	LINN	20177	SN	SHAWNEE
20039	DC	DECATUR	20109	LG	LOGAN	20179	SD	SHERIDAN
20041	DK	DICKINSON	20111	LY	LYON	20181	SH	SHERMAN
20043	DP	DONIPHAN	20113	MP	McPHERSON	20183	SM	SMITH
20045	DG	DOUGLAS	20115	MN	MARION	20185	SF	STAFFORD
20047	ED	EDWARDS	20117	MS	MARSHALL	20187	ST	STANTON
20049	EK	ELK	20119	ME	MEADE	20189	SV	STEVENS
20051	EL	ELLIS	20121	MI	MIAMI	20191	SU	SUMNER
20053	EW	ELLSWORTH	20123	MC	MITCHELL	20193	TH	THOMAS
20055	FI	FINNEY	20125	MG	MONTGOMERY	20195	TR	TREGO
20057	FO	FORD	20127	MR	MORRIS	20197	WB	WABAUNSEE
20059	FR	FRANKLIN	20129	MT	MORTON	20199	WA	WALLACE
20061	GE	GEARY	20131	NM	NEMAHA	20201	WS	WASHINGTON
20063	GO	GOVE	20133	NO	NEOSHO	20203	WH	WICHITA
20065	GH	GRAHAM	20135	NS	NESS	20205	WL	WILSON
20067	GT	GRANT	20137	NT	NORTON	20207	WO	WOODSON
20069	GY	GRAY	20139	OS	OSAGE	20209	WY	WYANDOTTE

Step 6: FTP the Soil data

When you click on Soil ftp site <ftp://gisdasc.kgs.ukans.edu/gisdata/ssurgo/>, it will display

FTP directory /gisdata/ssurgo/ at gisdasc.kgs.ukans.edu

Up to higher level directory

```
07/30/2002 05:04PM      Directory .
11/20/2002 03:53PM      Directory ..
07/03/2002 03:20PM      632 .message
07/03/2002 03:14PM      Directory cnty_mapjoin
07/31/2002 09:42AM      Directory soil_data_viewer
07/03/2002 03:26PM      Directory ssurgo_nad27
07/03/2002 03:11PM      Directory ssurgo_nad83
```

Because we want two counties, BR and AT, and they are all in ssurgo_nad27, we will get files from ssurgo_nad27. When click on ssurgo_nad27, it will display

FTP directory /gisdata/ssurgo/ssurgo_nad27/ at gisdasc.kgs.ukans.edu

Up to higher level directory

07/03/2002 03:26PM	Directory	.
07/30/2002 05:04PM	Directory	..
07/03/2002 03:20PM	3,024,971	<u>al.zip</u>
07/03/2002 03:20PM	5,089,746	<u>an.zip</u>
07/03/2002 03:20PM	2,443,793	<u>at.zip</u>
07/03/2002 03:20PM	3,570,370	<u>bb.zip</u>
07/03/2002 03:20PM	3,433,105	<u>br.zip</u>
07/03/2002 03:20PM	2,399,607	<u>bt.zip</u>
07/03/2002 03:26PM	10,048,722	<u>bu.zip</u>
07/03/2002 03:20PM	4,913,791	<u>ca.zip</u>
07/03/2002 03:20PM	7,448,600	<u>cd.zip</u>
07/03/2002 03:20PM	4,040,932	<u>cf.zip</u>
07/03/2002 03:20PM	2,989,573	<u>ck.zip</u>
07/03/2002 03:20PM	4,679,225	<u>cm.zip</u>
07/03/2002 03:21PM	4,651,292	<u>cn.zip</u>
07/03/2002 03:21PM	6,001,366	<u>cr.zip</u>
07/03/2002 03:21PM	2,815,372	<u>cy.zip</u>
07/03/2002 03:21PM	4,181,819	<u>dg.zip</u>
07/03/2002 03:21PM	5,725,457	<u>dk.zip</u>
07/03/2002 03:21PM	9,091,466	<u>el.zip</u>
07/03/2002 03:21PM	3,494,790	<u>fi.zip</u>
07/03/2002 03:21PM	4,674,558	<u>fo.zip</u>
07/03/2002 03:21PM	3,324,272	<u>fr.zip</u>
07/03/2002 03:21PM	2,080,716	<u>ge.zip</u>
07/03/2002 03:22PM	6,437,828	<u>gh.zip</u>
07/03/2002 03:22PM	1,894,256	<u>gt.zip</u>
07/03/2002 03:22PM	2,651,713	<u>gy.zip</u>
07/03/2002 03:22PM	5,498,126	<u>hg.zip</u>
07/03/2002 03:22PM	4,330,850	<u>hp.zip</u>
07/03/2002 03:22PM	1,361,193	<u>hs.zip</u>
07/03/2002 03:22PM	3,669,780	<u>hv.zip</u>
07/03/2002 03:22PM	6,925,270	<u>ja.zip</u>
07/03/2002 03:22PM	4,019,434	<u>jf.zip</u>
07/03/2002 03:22PM	1,945,075	<u>ke.zip</u>
07/03/2002 03:22PM	3,421,280	<u>kw.zip</u>
07/03/2002 03:22PM	3,629,634	<u>lb.zip</u>
07/03/2002 03:22PM	3,277,348	<u>le.zip</u>
07/03/2002 03:23PM	8,392,818	<u>ln_mi.zip</u>
07/03/2002 03:23PM	4,695,756	<u>lv_wy.zip</u>
07/03/2002 03:23PM	5,800,038	<u>ly.zip</u>
07/03/2002 03:23PM	4,390,125	<u>me.zip</u>
07/03/2002 03:23PM	3,248,366	<u>mg.zip</u>
07/03/2002 03:23PM	3,549,275	<u>mn.zip</u>
07/03/2002 03:23PM	3,322,025	<u>mp.zip</u>
07/03/2002 03:23PM	4,958,826	<u>mr.zip</u>
07/03/2002 03:23PM	5,592,956	<u>ms.zip</u>
07/03/2002 03:23PM	1,425,334	<u>mt.zip</u>
07/03/2002 03:23PM	3,963,910	<u>nm.zip</u>
07/03/2002 03:24PM	2,508,766	<u>no.zip</u>
07/03/2002 03:24PM	7,039,590	<u>ns.zip</u>
07/03/2002 03:24PM	6,452,500	<u>nt.zip</u>
07/03/2002 03:24PM	7,299,371	<u>ob.zip</u>
07/03/2002 03:24PM	5,798,497	<u>os.zip</u>

07/03/2002	03:24PM	5,341,326	ot.zip
07/03/2002	03:24PM	5,184,136	pl.zip
07/03/2002	03:24PM	4,335,956	pr.zip
07/03/2002	03:24PM	4,809,374	pt.zip
07/03/2002	03:24PM	3,232,038	rh.zip
07/03/2002	03:25PM	5,682,248	rl.zip
07/03/2002	03:25PM	6,695,966	rn.zip
07/03/2002	03:25PM	5,139,843	ro.zip
07/03/2002	03:25PM	7,381,520	rp.zip
07/03/2002	03:25PM	3,281,751	sa.zip
07/03/2002	03:25PM	3,539,748	sf.zip
07/03/2002	03:25PM	5,061,515	sg.zip
07/03/2002	03:25PM	3,938,768	sh.zip
07/03/2002	03:25PM	9,356,574	sm.zip
07/03/2002	03:26PM	6,015,592	sn.zip
07/03/2002	03:26PM	5,161,129	tr.zip
07/03/2002	03:26PM	2,650,060	wl.zip
07/03/2002	03:26PM	3,784,278	wo.zip
07/03/2002	03:26PM	5,118,378	ws.zip

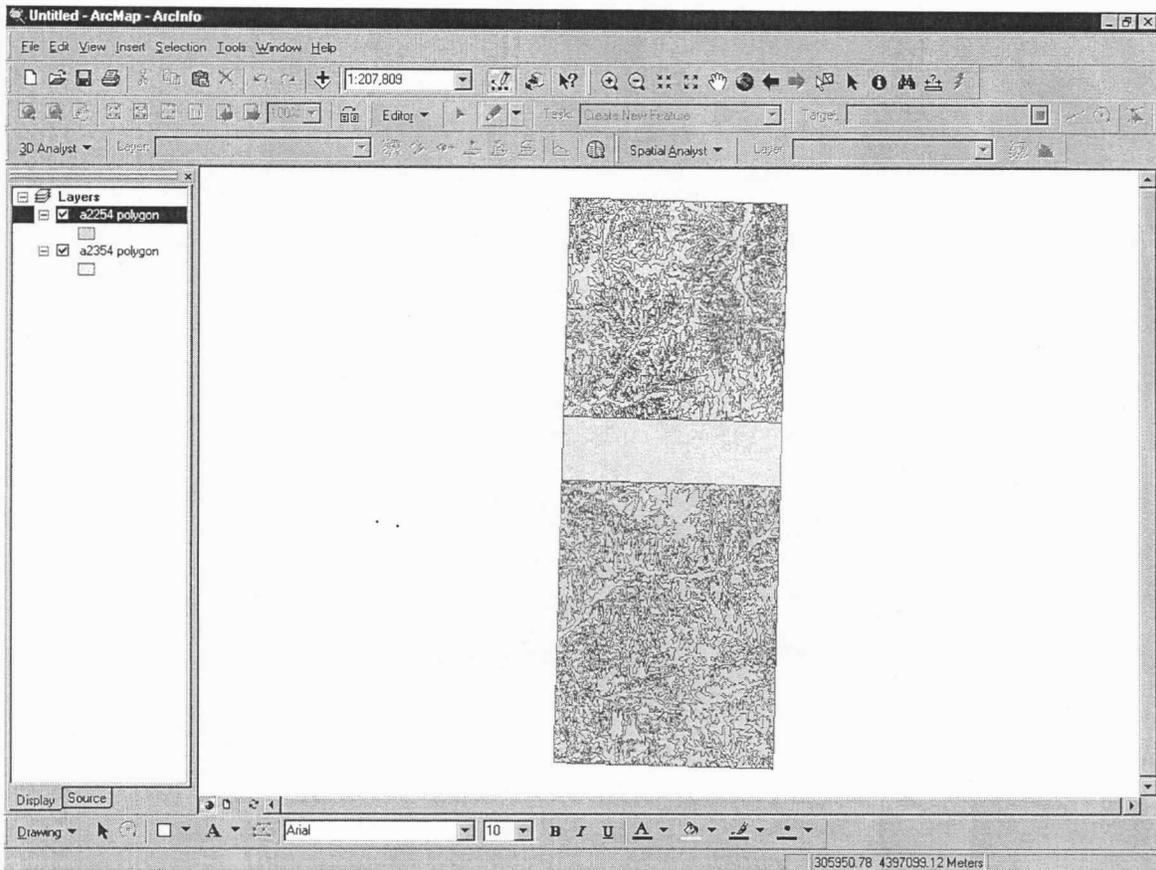
Click on br.zip and save it in the local computer. Do the same thing for at.zip. You will have two sets of Soil data for different counties.

Step 7: Unzip the Soil data

Unzip the Soil data you downloaded and they will be in different folders named as brsoil and atsoil. Each folder includes many files (one of them has 46 files), most of them e00 (ArcInfo interchange file format) files.

Step 8: View the Soil data

Before viewing the soil data, the e00 files have to be converted to coverages. The conversion is done with Arc/Info using Import function. Once the coverages are generated, they can be viewed in Arc/Map. For the example corresponding to the DEM, one e00 file from Brown county a2354.e00 and one from Atchison county a2254.e00 are prepared and shown below.



Step 9: Merge the Soil data

Two adjacent soil coverages need to be merged into one piece. For this example, it is a very complicated process and requires substantial GIS experience. It may have to copy other detailed soil coverages from other soil database into missing area and to manually edit and link, based on different scenarios. For a simple scenario, the approach described in next section, "Step-by-step procedure for landuse/field data preparation", may be used.

4. Step-by-step procedure for Landuse/field data preparation

Step 1: Find out where is DASC

Landuse data for Kansas can be found from the Data Access and Support Center of Kansas (DASC). DASC is a cooperating member of the National Spatial Data Infrastructure (NSDI). DASC's node contains Federal Geographic Data Committee (FGDC) compliant metadata, FTP access, search capabilities, and metadata submission capabilities. DASC is located at the Kansas Geological Survey

Here is the link to DASC:
<http://gisdasc.kgs.ku.edu/>

Step 2: Find out the location to download landuse/field data for Kansas

Landuse/field data is stored in [Kansas GeoDatabase](#) and the link is:

<http://mapster.kgs.ukans.edu/dasc/catalog/coredata.html>

To download Landuse/field, go to Land Surface/Geology/Soils Section.

• **Land Surface/Geology/Soils**

- [Detailed Soils 24K](#)
- [Digital Line Graphs \(DLG\) 24K](#)
DLG 24K Non-vegetative features
DLG 24K Vegetative Surface Cover
- [GAP Analysis Program \(GAP\)](#)
- [Geology](#)
Geology (Lines)
Geology (Polygons)
- [Geology - Surficial 24K](#)
- [Ground-based Statewide Vegetation Survey](#)
- [Land Cover](#)
- [Land Use/Land Cover 250K](#)
- [Riparian Inventory](#)
- [SSURGO](#)
- [STATSGO](#)
- [Soils - Mean Permeability](#)
- [Soils - Potential Runoff](#)
- [Soils Lite](#)

Step 3: Find out which Landuse/field data you want to use

For the watershed modeling, we use mainly [Land Cover](#)

The description page for [Land Cover](#) shows all technical information as following:

Title: [Land Cover](#)

Description: Land Cover identified by 10 cover types.

This dataset is tiled by: County

Projection: Geographic

Datum: NAD 27

File Format: ArcInfo Interchange

Status: This dataset is complete for Kansas. No status map.

Preview Data : [Available](#)

Download Data: [Available](#)

[Having problems downloading? **Check and see if you have a firewall.** If you are, you must contact **YOUR I.T.** department to fix the problem. If you are still having problems after fixing your firewall, try upgrading your browser, or use an FTP utility such as WS FTP connecting to gisdasc.kgs.ku.edu with username: *anonymous* and password: *your@emailaddress.*]

Additional Data Documentation: None at this time.

Data isn't how you would like it? Fill out an [On-Line Request Form](#).

Subscribe to databases and be notified of updates/additions to the GeoDatabase using the [DASC GeoDatabase Subscription Form](#).

Metadata Options:

[View FGDC \(html\)](#) | [Download FGDC \(txt\)](#) | [Download Abbreviated \(pdf\)](#)

Index Maps:

Used to determine the quad/county/huc name of your area of interest

- [Interactive Base Map](#)
- Static Maps
 - [County FIPS Codes](#)
 - [1:24,000](#)
 - [1:100,000](#)
 - [1:250,000](#)
 - [County](#)
 - [HUC](#)

Step 4: Find out which counties' landuse/field data you want to use

As indicated in the Status section, the dataset is complete for Kansas.

Status: This dataset is complete for Kansas. No status map.

Data for any county should be available.

Step 5: Find out the FIPS code and county abbr. of landuse/field data for the counties you want to use

Select the FIPS code and county abbr. from the following [County FIPS Codes](#)

FIPS Code	County Abbr	County Name	FIPS Code	County Abbr	County Name	FIPS Code	County Abbr	County Name
20001	AL	ALLEN	20071	GL	GREELEY	20141	OB	OSBORNE
20003	AN	ANDERSON	20073	GW	GREENWOOD	20143	OT	OTTAWA
20005	AT	ATCHISON	20075	HM	HAMILTON	20145	PN	PAWNEE
20007	BA	BARBER	20077	HP	HARPER	20147	PL	PHILLIPS
20009	BT	BARTON	20079	HV	HARVEY	20149	PT	POTTAWATOMIE
20011	BB	BOURBON	20081	HS	HASKELL	20151	PR	PRATT
20013	BR	BROWN	20083	HG	HODGEMAN	20153	RA	RAWLINS

20015	BU	BUTLER	20085	JA	JACKSON	20155	RN	RENO
20017	CS	CHASE	20087	JF	JEFFERSON	20157	RP	REPUBLIC
20019	CQ	CHAUTAUQUA	20089	JW	JEWELL	20159	RC	RICE
20021	CK	CHEROKEE	20091	JO	JOHNSON	20161	RL	RILEY
20023	CN	CHEYENNE	20093	KE	KEARNY	20163	RO	ROOKS
20025	CA	CLARK	20095	KM	KINGMAN	20165	RH	RUSH
20027	CY	CLAY	20097	KW	KIOWA	20167	RS	RUSSELL
20029	CD	CLOUD	20099	LB	LABETTE	20169	SA	SALINE
20031	CF	COFFEY	20101	LE	LANE	20171	SC	SCOTT
20033	CM	COMANCHE	20103	LV	LEAVENWORTH	20173	SG	SEDGWICK
20035	CL	COWLEY	20105	LC	LINCOLN	20175	SW	SEWARD
20037	CR	CRAWFORD	20107	LN	LINN	20177	SN	SHAWNEE
20039	DC	DECATUR	20109	LG	LOGAN	20179	SD	SHERIDAN
20041	DK	DICKINSON	20111	LY	LYON	20181	SH	SHERMAN
20043	DP	DONIPHAN	20113	MP	McPHERSON	20183	SM	SMITH
20045	DG	DOUGLAS	20115	MN	MARION	20185	SF	STAFFORD
20047	ED	EDWARDS	20117	MS	MARSHALL	20187	ST	STANTON
20049	EK	ELK	20119	ME	MEADE	20189	SV	STEVENS
20051	EL	ELLIS	20121	MI	MIAMI	20191	SU	SUMNER
20053	EW	ELLSWORTH	20123	MC	MITCHELL	20193	TH	THOMAS
20055	FI	FINNEY	20125	MG	MONTGOMERY	20195	TR	TREGO
20057	FO	FORD	20127	MR	MORRIS	20197	WB	WABAUNSEE
20059	FR	FRANKLIN	20129	MT	MORTON	20199	WA	WALLACE
20061	GE	GEARY	20131	NM	NEMAHA	20201	WS	WASHINGTON
20063	GO	GOVE	20133	NO	NEOSHO	20203	WH	WICHITA
20065	GH	GRAHAM	20135	NS	NESS	20205	WL	WILSON
20067	GT	GRANT	20137	NT	NORTON	20207	WO	WOODSON
20069	GY	GRAY	20139	OS	OSAGE	20209	WY	WYANDOTTE

Step 6: FTP the landuse/field data

When you click on landuse/field ftp site <ftp://gisdasc.kgs.ukans.edu/gisdata/landcover>, it will display

FTP directory /gisdata/landcover at gisdasc.kgs.ukans.edu

Up to higher level directory

```

07/03/2002 11:55AM Directory .
11/20/2002 03:53PM Directory ..
06/06/2001 12:00AM      202 .message
09/07/2000 12:00AM 2,045,086 al_landc.zip
09/07/2000 12:00AM 2,714,080 an_landc.zip
09/07/2000 12:00AM 2,476,577 at_landc.zip
09/07/2000 12:00AM 2,064,450 ba_landc.zip
09/07/2000 12:00AM 4,020,815 bb_landc.zip
09/07/2000 12:00AM 3,400,885 br_landc.zip
09/07/2000 12:00AM 2,568,236 bt_landc.zip
09/07/2000 12:00AM 4,737,834 bu_landc.zip
09/07/2000 12:00AM   894,096 ca_landc.zip
09/07/2000 12:00AM 3,188,992 cd_landc.zip
09/07/2000 12:00AM 2,908,654 cf_landc.zip
09/07/2000 12:00AM 3,295,973 ck_landc.zip

```

09/07/2000	12:00AM	3,957,081	<u>cl_landc.zip</u>
09/07/2000	12:00AM	1,309,428	<u>cm_landc.zip</u>
09/07/2000	12:00AM	1,452,879	<u>cn_landc.zip</u>
09/07/2000	12:00AM	2,348,024	<u>cq_landc.zip</u>
09/07/2000	12:00AM	3,676,385	<u>cr_landc.zip</u>
09/07/2000	12:00AM	1,795,153	<u>cs_landc.zip</u>
09/07/2000	12:00AM	3,284,014	<u>cy_landc.zip</u>
09/07/2000	12:00AM	2,014,486	<u>dc_landc.zip</u>
09/07/2000	12:00AM	3,297,269	<u>dg_landc.zip</u>
09/07/2000	12:00AM	4,118,716	<u>dk_landc.zip</u>
09/07/2000	12:00AM	1,888,779	<u>dp_landc.zip</u>
09/07/2000	12:00AM	1,529,433	<u>ed_landc.zip</u>
09/07/2000	12:00AM	2,042,090	<u>ek_landc.zip</u>
09/07/2000	12:00AM	2,435,794	<u>el_landc.zip</u>
09/07/2000	12:00AM	2,242,859	<u>ew_landc.zip</u>
09/07/2000	12:00AM	1,403,279	<u>fi_landc.zip</u>
09/07/2000	12:00AM	1,287,373	<u>fo_landc.zip</u>
09/07/2000	12:00AM	3,820,079	<u>fr_landc.zip</u>
09/07/2000	12:00AM	2,109,054	<u>ge_landc.zip</u>
09/07/2000	12:00AM	2,113,327	<u>gh_landc.zip</u>
09/07/2000	12:00AM	194,857	<u>gl_landc.zip</u>
09/07/2000	12:00AM	1,760,206	<u>go_landc.zip</u>
09/07/2000	12:00AM	287,505	<u>gt_landc.zip</u>
09/07/2000	12:00AM	3,276,563	<u>gw_landc.zip</u>
09/07/2000	12:00AM	621,688	<u>gy_landc.zip</u>
09/07/2000	12:00AM	1,168,671	<u>hg_landc.zip</u>
09/07/2000	12:00AM	425,943	<u>hm_landc.zip</u>
09/07/2000	12:00AM	1,747,760	<u>hp_landc.zip</u>
09/07/2000	12:00AM	217,344	<u>hs_landc.zip</u>
09/07/2000	12:00AM	1,550,797	<u>hv_landc.zip</u>
09/07/2000	12:00AM	3,423,171	<u>ja_landc.zip</u>
09/07/2000	12:00AM	3,724,945	<u>jf_landc.zip</u>
09/07/2000	12:00AM	3,592,359	<u>jo_landc.zip</u>
09/07/2000	12:00AM	3,625,123	<u>jw_landc.zip</u>
09/07/2000	12:00AM	611,976	<u>ke_landc.zip</u>
09/07/2000	12:00AM	5,749,328	<u>km_landc.zip</u>
09/07/2000	12:00AM	1,560,309	<u>kw_landc.zip</u>
10/25/2000	12:00AM	4,359	<u>landcov.avl</u>
09/07/2000	12:00AM	3,724,735	<u>lb_landc.zip</u>
09/07/2000	12:00AM	2,188,538	<u>lc_landc.zip</u>
09/07/2000	12:00AM	721,613	<u>le_landc.zip</u>
10/25/2000	12:00AM	1,046	<u>legend.zip</u>
09/07/2000	12:00AM	1,123,415	<u>lg_landc.zip</u>
09/07/2000	12:00AM	3,764,978	<u>ln_landc.zip</u>
09/07/2000	12:00AM	3,603,921	<u>lv_landc.zip</u>
09/07/2000	12:00AM	3,473,019	<u>ly_landc.zip</u>
09/07/2000	12:00AM	2,186,238	<u>mc_landc.zip</u>
09/07/2000	12:00AM	815,141	<u>me_landc.zip</u>
09/07/2000	12:00AM	3,122,855	<u>mg_landc.zip</u>
09/07/2000	12:00AM	3,974,340	<u>mi_landc.zip</u>
09/07/2000	12:00AM	3,626,180	<u>mn_landc.zip</u>
09/07/2000	12:00AM	2,406,929	<u>mp_landc.zip</u>
09/07/2000	12:00AM	2,966,459	<u>mr_landc.zip</u>
09/07/2000	12:00AM	5,309,226	<u>ms_landc.zip</u>
09/07/2000	12:00AM	376,037	<u>mt_landc.zip</u>
09/07/2000	12:00AM	3,929,741	<u>nm_landc.zip</u>
09/07/2000	12:00AM	3,235,810	<u>no_landc.zip</u>

09/07/2000 12:00AM	1,845,721	ns_landc.zip
09/07/2000 12:00AM	2,217,279	nt_landc.zip
09/07/2000 12:00AM	2,347,951	ob_landc.zip
09/07/2000 12:00AM	3,713,589	os_landc.zip
09/07/2000 12:00AM	2,381,825	ot_landc.zip
09/07/2000 12:00AM	3,089,123	pl_landc.zip
09/07/2000 12:00AM	2,084,742	pn_landc.zip
09/07/2000 12:00AM	1,283,876	pr_landc.zip
09/07/2000 12:00AM	4,319,757	pt_landc.zip
09/07/2000 12:00AM	1,997,606	ra_landc.zip
09/07/2000 12:00AM	1,716,557	rc_landc.zip
09/07/2000 12:00AM	1,932,942	rh_landc.zip
09/07/2000 12:00AM	3,320,464	rl_landc.zip
09/07/2000 12:00AM	4,070,617	rn_landc.zip
09/07/2000 12:00AM	2,616,118	ro_landc.zip
09/07/2000 12:00AM	3,167,006	rp_landc.zip
09/07/2000 12:00AM	2,944,636	rs_landc.zip
09/07/2000 12:00AM	2,815,136	sa_landc.zip
09/07/2000 12:00AM	479,415	sc_landc.zip
09/07/2000 12:00AM	1,227,482	sd_landc.zip
09/07/2000 12:00AM	1,440,211	sf_landc.zip
09/07/2000 12:00AM	4,574,080	sg_landc.zip
09/07/2000 12:00AM	948,075	sh_landc.zip
09/07/2000 12:00AM	3,545,367	sm_landc.zip
09/07/2000 12:00AM	3,485,106	sn_landc.zip
09/07/2000 12:00AM	299,342	st_landc.zip
09/07/2000 12:00AM	6,420,417	su_landc.zip
09/07/2000 12:00AM	342,883	sv_landc.zip
09/07/2000 12:00AM	484,383	sw_landc.zip
09/07/2000 12:00AM	1,077,188	th_landc.zip
09/07/2000 12:00AM	1,930,895	tr_landc.zip
09/07/2000 12:00AM	692,709	wa_landc.zip
09/07/2000 12:00AM	2,936,267	wb_landc.zip
09/07/2000 12:00AM	307,462	wh_landc.zip
09/07/2000 12:00AM	2,838,195	wl_landc.zip
09/07/2000 12:00AM	1,983,653	wo_landc.zip
09/07/2000 12:00AM	5,085,562	ws_landc.zip
09/07/2000 12:00AM	1,412,625	wy_landc.zip

Here we want two counties, BR and AT. Click on [br_landc.zip](#) and save it in the local computer. Do the same thing for [at_landc.zip](#). You will have two landuse/field data sets for different counties.

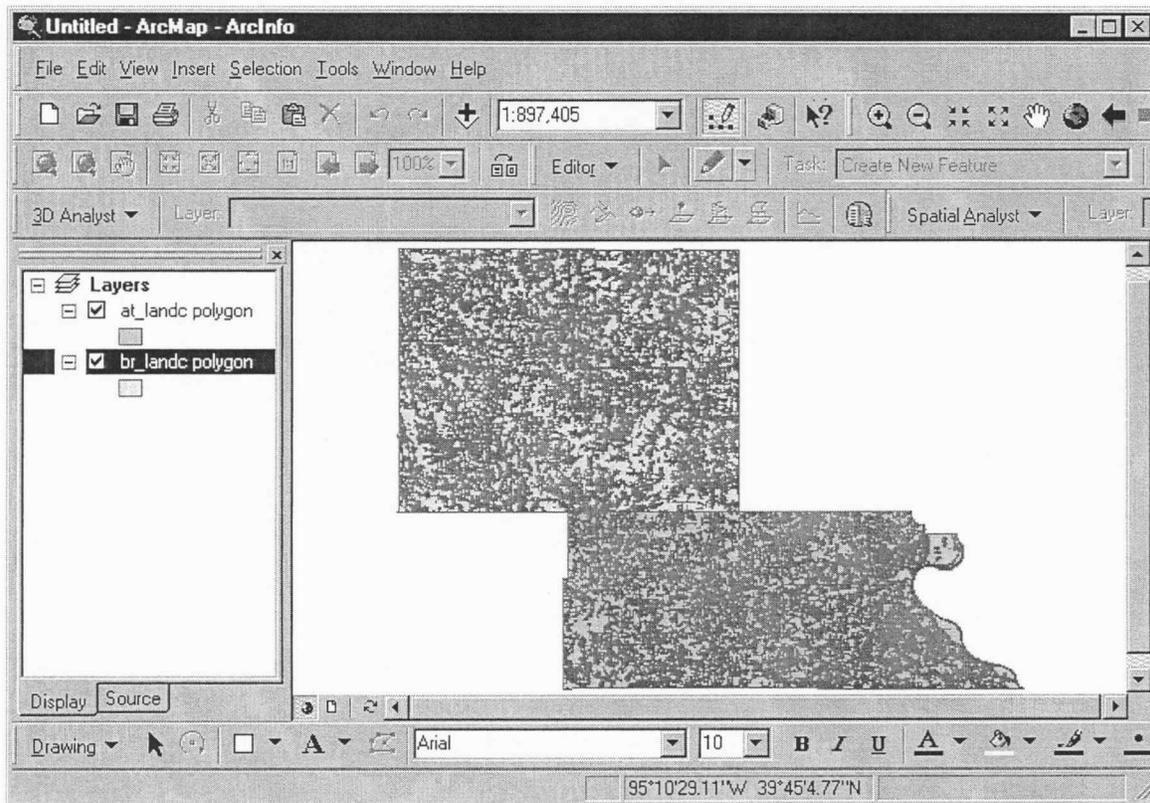
Step 7: Unzip the Landuse/field data

Unzip the Landuse/field data you downloaded and they will be in different folders named as [brlanduse](#) and [atlanduse](#). Each folder includes several files with one e00 file.

Step 8: View the Landuse/field data

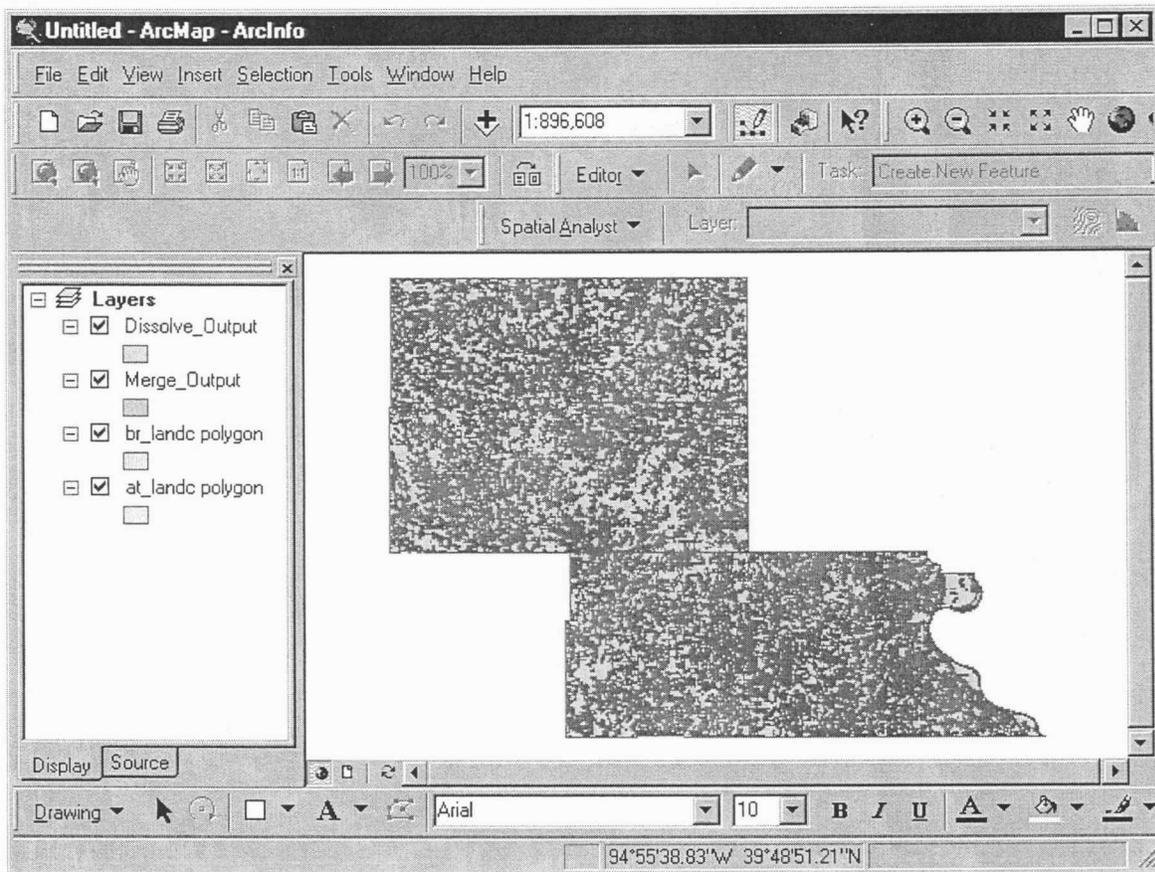
Before viewing the landuse/field data, the e00 files have to be converted to coverages. The conversion is done with Arc/Info with the Import function. Once the coverages are

generated, they can be viewed in Arc/Map. For the example, one e00 file from Brown county and one from Atchison county are prepared and shown below.



Step 8: Merge the Landuse/field data

Two adjacent landuse/field coverages need to be merged into one piece. Click Tool->GeoProcessing Wizard->check merge layers together->Click next->Select at least two layers to merge->Click Finish to generate a merged coverage. Click Tool->GeoProcessing Wizard->check Dissolve features based on an attribute->Click next->Select an attribute on which to dissolve COV_CLASS->Click Next then Finish to generate a dissolved coverage. As an example, one merged and dissolved landuse/field map for two counties is shown below. It was generated in ArcMap through the merge and the dissolve functions.



5. Final Remark

The report provides a step by step procedure for preparing DEM, soil, landuse data by using Arc/GIS 8.2 and ArcView 3.3. There may other alternatives, but mainly depending on data sources and formats. The quality of data is always the most important issue and it is totally up to the users to practice the quality control for the data.

Acknowledgments

Appreciation is expressed to Dr. Don Whittemore for helping to edit the major part of this report.